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ION 706 OF THE TELECOMMUNICATIONS ACT F 1996 AND RELATED BANDWIDTH ISSUES

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMUNICATIONS

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED FIFTH CONGRESS

SECOND SESSION

APRIL 22, 1998

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

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SECTION 706 OF THE TELECOMMUNICATIONS ACT OF 1996 AND RELATED BANDWIDTH ISSUES

WEDNESDAY, APRIL 22, 1998

U.S. SENATE,
SUBCOMMITTEE ON COMMUNICATIONS,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:35 a.m., in room SR–253, Russell Senate Office Building, Hon. Conrad Burns (chairman of the subcommittee) presiding.

Staff members assigned to this hearing: Kalpak Gude, Republican counsel; Kevin M. Joseph, senior Democratic counsel; and Paula Ford, Democratic counsel.

STATEMENT OF HON. CONRAD BURNS, U.S. SENATOR FROM MONTANA

Senator BURNS. We will call the committee to order. And I have to apologize for being a wee bit late here this morning. This seems to be an issue that takes up a lot of thinking time, and I have never been known to be a deep thinker. So it takes me a little bit longer.

I would like to welcome our witnesses here today for a hearing on a topic that I think has vital interest to the continuing strength of the information revolution. And that is: "How do we Facilitate the Build-out of Broadband Technology."

The Internet has transformed itself, in a few short years, from an obscure online outpost frequented mainly by scientists, into a mass medium, used daily by over 50 million people now. The explosion of information technology has created opportunities undreamed of by previous generations. Companies, ranging from garage startups to multinational corporations, are bringing their goods and services to the electronic realm at an ever-escalating rate. Students are able to gain access to educational materials despite their geographical location.

All of these exciting opportunities risk being stopped dead in their tracks by a problem caused by the very popularity and the productivity of the Internet. And that is data congestion. In short, I am told there is a bandwidth deficit developing in the public switch network. The reason for this deficit is the onslaught of data traffic on the network. Local telephone companies calculate that by the year 2000, they will be carrying as much Internet data as they

will voice traffic. In some areas of the country, I am told that that is already the case.

If that be true, maybe the first step in alleviating the congestion is to understand the fundamental difference between data traffic and voice traffic. Voice circuits carry about 4,000 bits per second, while data circuits carry 100 million bits per second. Data also changes the nature of the usage. Nearly one-third of the total minutes of use generated by dial-up Internet traffic comes from calls lasting more than 3 hours. The average telephone call by voice lasts about 4 to 5 minutes.

Understanding the challenge before us, and all this information that this Senator has anyway, one has to conclude significant investment is necessary to overcome this bandwidth deficit. The deployment of advanced network capabilities was a significant goal of the 1996 Act. Now I question whether that goal is being fulfilled, despite the overwhelming demand for these services.

Today the subcommittee will hear from witnesses who will testify as to the phenomenal advances being made in the field of broadband media. Current and future projects reveal a world that will see advanced broadband services, such as the Internet, interactive video, and multimedia offered to consumers regardless of their location. The subcommittee will hear about the distribution technologies, such as fiber, ADSL and satellite, that all feature data speeds greater than the current modems offered today.

These technologies are particularly important to rural States. I know of a State with 148,000 square miles and only about 850,000 people, and they have more than a passing interest in what we are doing. I know my colleagues are just as concerned about the current data bottleneck and the technologies that could open it up.

I anticipated some aspects of the current crisis when we debated the 1996 Act. At that time, I was concerned that we might end up with a regulatory structure that would create disincentives for investment. To address this, I authored section 706, which directs the FCC, in conjunction with the State public utilities commissions, to develop a policy that promotes the deployment of advanced telecommunications capability through deregulatory measures.

I look forward to today's testimony from the industry, as an opportunity to build a record with regard to the appropriate use of section 706. Later oversight hearings will provide a forum to followup with the Commission concerning the implementation of this fundamental area of the Telecommunications Act.

The true potential of the information age is that it will bring advanced interactive broadband telecommunications to literally all regions of this country and the world. We look forward to the future of a limitless opportunity, where individuals can become businesses overnight, citizens have access to an endless chain of information. Increasing bandwidth is a critical step in ensuring that this dream can become a reality.

So I look forward to our witnesses today. It is nice to see my colleagues here today, and I will turn now to Senator Stevens, of Alaska.

[The prepared statement of Senator Burns follows:]

PREPARED STATEMENT OF HON. CONRAD BURNS, U.S. SENATOR FROM MONTANA

I would like to welcome our witnesses today for a hearing on a topic of vital interest to the continuing strength of the information revolution: "How to Facilitate the Build-out of Broadband Technology."

The Internet has transformed itself in a few short years from an obscure online outpost frequented mainly by scientists to a mass medium used daily by over 50 million people worldwide. The explosion of information technology has created opportunities undreamed of by previous generations. Companies ranging from garage startups to multinational corporations are bringing their goods and services into the electronic realm at an ever-escalating rate. Students are able to gain access to educational materials despite their geographical location.

All of these exciting opportunities risk being stopped dead in their tracks by a problem caused by the very popularity and productivity of the Internet: data congestion. In short, there is a looming "bandwidth deficit" developing in the public switched network. The reason for this looming deficit is the onslaught of data traffic on the network. Local telephone companies calculate that by the year 2000, they will be carrying as much Internet data as voice traffic. In some areas of the country, this is already the case.

The first step in alleviating this congestion is to understand the fundamental difference between data traffic and voice traffic. Data requires far more bandwidth—voice circuits carry only 4 thousand bits per second while data circuits carry 100 million bits per second. Data also changes the nature of usage. Nearly one-third of the total minutes of use generated by dial-up Internet traffic comes from calls lasting more than 3 hours. The average telephone call is 4 to 5 minutes.

Significant investment is necessary to overcome this bandwidth deficit. The deployment of advanced network capabilities was a significant goal and promise of the 1996 Act. I question whether this promise is being fulfilled, despite the overwhelming demand for these services.

Today the Subcommittee will hear from witnesses who will testify as to the phenomenal advances being made in the field of broadband media. Current and future projects reveal a world that will see advanced broadband services such as the Internet, interactive video, and multimedia offered to consumers regardless of their location. The Subcommittee will hear about distribution technologies such as fiber, ADSL and satellite that all feature data speeds exponentially greater than current modems offer today. These technologies are particularly important to rural states such as Montana, a state with 148,000 square miles and only about 850,000 people. I know my colleagues are just as concerned about the current data bottleneck and the technologies that could open it up.

I anticipated some aspects of the current crisis in 1996. At that time, I was concerned that we might end up with a regulatory structure that would create disincentives for investment. To address this, I authored Section 706 which directs the FCC and the State Public Utility Commissions to promote the deployment of advanced telecommunications capabilities through deregulatory measures.

I look forward to today's testimony from industry as an opportunity to build a record with regard to the appropriate use of Section 706. Later oversight hearings will provide a forum to followup with the Commission concerning the implementation of this fundamental area of the Telecommunications Act.

The true promise of the information age is that it will bring advanced interactive broadband communications to literally all regions of the country and the world. We look forward to a future of limitless opportunity, where individuals can become businesses overnight and citizens have access to boundless information. Increasing bandwidth is a critical step in ensuring that this dream can become a reality.

I look forward to hearing all the witnesses' testimony, and I thank them for taking the time to appear here today.

STATEMENT OF HON. TED STEVENS, U.S. SENATOR FROM ALASKA

Senator STEVENS. Thank you very much. I am sorry to be a little late.

I have to tell you, Mr. Chairman, I have a defense appropriations hearing at 10, unfortunately. I want to make a brief statement, and I hope that will be all right. And I would ask that I can submit some questions for the record.

Senator BURNS. Without objection.

Senator STEVENS. And I thank you, Senator Burns, for holding this hearing today, because it gives me a chance, 11 days after the issuance of the Universal Service Report which the Congress requested at my suggestion, to reassert once again the FCC got it wrong. In its report, the FCC insisted once again that telecommunications service and information service are mutually exclusive.

This section 706 debate is the perfect example of how the house of cards established by the Commission will ultimately collapse. Section 706 seeks to ensure that advanced telecommunications capability is available to all Americans. This capability is defined as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications. These are services that all Americans should ultimately have the opportunity to enjoy.I21But under the FCC's recent interpretations, these services will be considered enhanced or information services. Under such an interpretation, no contributions would flow to the Universal Service Fund from these enhanced networks, and essentially a two-tiered system will develop. On the one hand, we would have the old, outdated circuit-switched common carrier network, and on the other, the new, private broadband network for information services. This is an artificial separation of voice and data that will lead ultimately to the demise of the public switched network, which was clearly not what Congress intended.

I do not believe the FCC has authority to approve the pending petitions, given section 10(d) of the Act, which required full implementation of the local competition provisions. However, these petitions do highlight the need for a new set of rules that should reflect modern communications technology.

Our intent in the 1996 Act was to promote local competition across the board. We want competition for local broadband services. Approval of these petitions at this time will allow the Bell companies to avoid competition—no resale or unbundling in the broadband arena—when the FCC still does not have effective competition within the existing network.

The farm team, which we called ourselves in Congress, worked hard to ensure that the 1996 Act would preserve an evolving definition of Universal Service. I look forward to working with all members on this important issue. I read Senator Rockefeller's very interesting statement that he has made about Universal Service—I share his news that we achieve the goal of our Act—that all Americans get the benefits of competitive broadband services to the home—as stated in section 706.

Thank you, Mr. Chairman.

Senator BURNS. Thank you, Senator Stevens.

Senator Rockefeller.

STATEMENT OF HON. JOHN D. ROCKEFELLER IV, U.S. SENATOR FROM WEST VIRGINIA

Senator ROCKEFELLER. Thank you, Mr. Chairman.

Any hearing that you hold is a good one. That has been my experience.

Senator BURNS. Thank you.

Senator ROCKEFELLER. You are welcome.

And this is particularly good, because it gets to the business that affects all three of our States, in fact, very dramatically, where we are going to have haves and have-nots. You have been discussing it in one way, Senator Stevens, and I agree with a lot of what you said. I was disappointed by the FCC's interpretation of the ISP. I think they went partway, but they clearly left part of it uncovered, in a definition deficiency. And I think they talk about doing more, but we will see.

In any event, on this, where we are dealing with very, very sophisticated technology increases, I think we have to understand the interactions. Is one section of the law going to run into another section—section 706, and then the 14 points requirement? Are we going to spur competition, in fact? How do we do that? Is it going to be fair to all sectors? How do we make sure of that?

Again, we do not want to have a digital divide. These are complicated matters. Senators are not experts on this, but want very much to be, which is one of the reasons why I think this morning's hearing is extremely important. And I thank you.

Senator BURNS. Thank you, Senator Rockefeller.

We would like to invite to the table now Mr. Ellwood Kerkeslager, vice president for Technology and Infrastructure for the AT&T Corporation; Mr. Charles McMinn, president and CEO of COVAD Communications, of Santa Clara, CA; and Joseph Zell, who is president, !nterprise Networking Service, U S West Communications out of Denver, CO.

Gentlemen, we welcome you here this morning. Thank you for taking the time, and sharing some of your information and some of your knowledge with this committee.

We will start with Mr. Kerkeslager, who is vice president of Technology and Infrastructure of the AT&T corporation. Thank you for coming.

STATEMENT OF ELLWOOD R. KERKESLAGER, VICE PRESIDENT OF TECHNOLOGY AND INFRASTRUCTURE, AT&T CORP.

Mr. KERKESLAGER. Thank you, Mr. Chairman, for this opportunity to testify on broadband in the local loop.

As you noted in your comments, this subject is of vital interest to our economy, to the continued American leadership in the digital economy.

I have submitted written testimony, which details AT&T's investments in fiber and bandwidth-multiplying, dense-wave division multiplexing. I also discuss in that written testimony why we feel that the RBOC calls for extensions of their monopolies into broadband data, while continuing to frustrate competition in the local markets, is wrong, is not within the FCC's statutory authority to grant in section 706, and would not lead to improved consumer broadband services.

I would like to ask that my written testimony be included in the record of this proceeding.

Senator BURNS. It shall be. And I might add that all witnesses can submit their written statement, and then, if they want to condense that down, well, that is OK with me.

Mr. KERKESLAGER. Thank you, Mr. Chairman.

Senator BURNS. We will probably get a big argument at the table, anyway, before it is all over.

Mr. KERKESLAGER. Mr. Chairman, in the 5 minutes of oral comments, I would like to talk plainly, if I may, about what is and what is not happening in the areas of broadband services in the local loop, competition in the provision of broadband services and the impacts of these on the economy and on consumers.

One of the largest and most rapidly growing sectors of our economy, information technology—recently reported by the Department of Commerce as the largest and most rapidly growing, the biggest sector of our economy—depends heavily on broadband in the local loop. The PC industry, the processor industry, the chip industry, software, the Internet, the content providers, all look to broadband in the local loop to determine their future growth and the provision of services to consumers. Their growth is now being stunted because one link in the networked economy is weak: the local loop. And that link is weak because the RBOCs refuse to implement the plain intent of the Telecommunications Act of 1996 and the FCC's rules.

The consumers and businesses of America are being denied access to broadband capabilities because the RBOCs refuse to allow competition to access the local loop on reasonable terms and conditions. While AT&T and other interexchange carriers and Internet service providers are investing billions of dollars installing fiber at breakneck speeds, and using state-of-the-art technology and multiplying the capacity of their existing fiber networks—by a factor of 10, I might add—the RBOCs do not see enough demand for broadband services for them to justify investments in the local loop.

While small startups like COVAD can identify market needs for broadband services and get customer contracts to provide these services, the RBOCs will not let them get into the loops or collocation space without up-front charges of hundreds of thousands of dollars, if they will let them in the door at all.

Mr. Chairman and members of the committee, this display of monopoly power, standing in the way of competition and advances in technology, and the national economy, would be totally incomprehensible if we had not already seen a parallel to it in an earlier era—the same Bell operating company delays, the same concerns about harms to the network, the same attempts to impose costly protective arrangements on competitors and keep them at arm's length—preceded the ultimate success of the FCC's efforts to allow competition in the telephone set industry.

Those of you who, like me, are old enough to remember that will recall the parallels to the ultimate success of the FCC's actions. This was a fabulously successful regulatory driven transition from monopoly to competition. From that regulatory mandate, with industry developed standards, multiple, worldwide, competitive, new technology markets developed. The telephone set industry, the answering set industry, modems, fax machines, PC's for homes and businesses, and the Internet itself all can trace their origins to that FCC action and the successful implementation of a transition from monopoly to competitive markets in the, "telephone set industry."

This can be traced with direct parallels to our present situation. How do you provide competitive market access to the local tele-

phone line, the local loop? In the 1960's, the industry, in response to the FCC's rules, developed the standard surrounding the now familiar plug in the wall, the telephone jack. Senators, that is what we are talking about here. Give the competitors access to the other end of the local loop in collocated space in the RBOC office, and let them plug in their electronic equipment.

The competitors now have the technology. In fact, they have had it for 5 years or more. Let the competitors make broadband services available using the local loop.

The RBOCs also have access to that same technology. They have had it for over 5 years. They simply have chosen not to make it available to consumers. They have forced consumers to use slower-speed modems, to use their local switch, and then complain that there is too much demand for lines and switch capacity.

By the way, by forcing consumers to use the local switch and not allowing companies to come in and serve the Internet traffic directly, the RBOCs not only did a disservice to consumers, to competitors and to Internet service providers, they also wasted untold millions of telephone numbers—telephone numbers which could be saved by competitive connections directly to an Internet service provider—telephone number demand which is driving—even forcing—our State regulatory commissions now to change area codes for millions of Americans.

We do not have, Mr. Chairman, a shortage of competitive desire to invest in the local loop or of innovation in broadband services for consumer and small businesses. The technology and the competitors are at the door, but they cannot get in. We do have an attempt to divert Congress and the regulators' attention from the real issues. The local monopolies are not implementing the law you passed and the reasonable regulatory transition plan that has been put in place by the FCC. The local monopolies are doing everything possible to delay, while trying to convince you that the law is not working, the competition is not ready and willing, the monopolies must be given incentives and even a broader monopoly.

Thank you, Mr. Chairman, for this opportunity to testify, and I look forward to your questions.

[The prepared statement of Mr. Kerkeslager follows:]

PREPARED STATEMENT OF ELLWOOD R. KERKESLAGER, VICE PRESIDENT OF TECHNOLOGY AND INFRASTRUCTURE, AT&T CORP.

AT&T appreciates the invitation to testify before the subcommittee today about the nation's progress in delivering advanced services to consumers and in building the infrastructure that will support the delivery of such services in the future. In the historic Telecommunications Act of 1996 (the Act), the Congress recognized the potential for advanced services to become a critical part of the nation's economic and social fabric. It therefore directed the Commission in Section 706 to initiate an inquiry by August 8, 1998 to examine whether advanced telecommunications capability is being deployed to all Americans "in a reasonable and timely fashion." The Commission has indicated that it will open such an inquiry by early summer, and AT&T looks forward to participating fully in that proceeding. In the meantime, several Regional Bell Operating Companies (RBOCs) have petitioned the Commission for "waivers" under Section 706 of their fundamental—and non-waivable—obligations under other provisions of the Act (Sections 251 and 271) to open their local networks to competition and to ensure that those networks are open before they may enter the long distance market. As we discuss below, those petitions should be seen for the sham filings that they are.

A LOOK AT THE MARKETPLACE

The growth in the use of online services, and the capability of the nation's longhaul communications networks to deliver them at ever-higher speeds, has been extraordinary over the past few years. A study released by the Department of Commerce earlier this month, titled The Emerging Digital Economy, quantifies the growth of the Internet and in doing so, paints a remarkable picture of the role of the Internet in American life. According to the report: the number of people using the Internet grew from 5 million in 1993 to 40 million in 1996 to 100 million by the end of 1997 (pp. 2 and 8), and traffic on the Internet has been doubling every 100 days (p. 8). The number of top-level commercial domain names (.com) that have been assigned grew from 27,000 in early 1995 to 764,000 by mid-1997 (p. 8). Consumers are buying everything from books to cars to tickets and much more over the Internet. Amazon.com's book sales shot up from $16 million in 1996 to $148 million in 1997, while a company called Auto-by-Tel was selling $500 million worth of cars each month by the end of November 1997 (p. 2). The Department of Commerce further reports that in recent years, information technology companies have been responsible for more than 25% of real economic growth. (p. 6). Online services have taken a front seat in the economy, and Americans are using them enthusiastically.

Investment in the Internet backbone networks that are needed to support this new world is continuing at a rapid clip. In January 1998, AT&T announced plans to install dense wavelength division multiplexing (DWDM) technology—which uses light to magnify transmission—to expand the bandwidth of our 40,000 mile existing network by a factor of up to 10, without having to lay additional fiber-optic cable. MCI and UUNet quadrupled their backbone capacity in 1997, and the major backbone providers have plans to quadruple capacity again.[1] Qwest announced last week the activation of its entire coast-to-coast IP network, giving it 5,400 route miles in service. It plans to complete its 16,000 mile fiber network in mid-1999, serving over 125 cities which represent about 80 percent of the voice and data traffic originating in the United States.[2] Level 3 expects to build a 20,000 mile fiber network by 1999 and will also be leasing capacity along from Frontier's 13,000 mile fiber-optic backbone, giving it access to 15 major U.S. markets. Williams has construction plans to expand its network to 20,000 miles within a year; and IXC, Worldcom and Metromedia all have plans for similarly sized high speed networks in the 1998/1999 time frame.[3]

THE RBOCS' LATEST GAMBIT TO AVOID THE ACT'S UNBUNDLING AND RESALE REQUIREMENTS

It is against this backdrop of extraordinary growth and investment that the RBOCs have filed their 706 petitions seeking the ability to offer broadband services without regard to unbundling and resale requirements for advanced services or interLATA services restrictions. In exchange for this broad relief, Bell Atlantic purports to promise "a regional backbone network, capable of providing Digital Subscriber Loop ("DSL") or fiber-based services, that passes most homes in the major markets in its region." In essence, the RBOCs request that they be allowed to "trade in" their existing monopoly over "traditional" telephony services, for a new monopoly over both traditional and "advanced" telecommunications services, which the Act is also designed to open to competitors.

These petitions to the Commission offer neither a statutory basis for the broad relief that they request, nor persuasive factual or policy support. The RBOCs are in essence seeking a risk-free environment in which they can enlarge their existing monopoly in the local exchange to include high-speed services to the home and business, and at the same time leverage their monopoly into the booming market for Internet backbone capacity. Even if the Commission had the authority under the Act to grant the requested relief to enable the RBOCs to undertake these efforts (which it does not), such relief is not justified as long as they retain their monopoly hold on local exchange and exchange access services.

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[1] "Sprint Dramatically Boosts Speed and Bandwidth on its Internet Network," Sprint Press Release, September 3, 1997 ("By deploying the Cisco 12,000 series [of router], Sprint will increase bandwidth 400 percent by running live traffic over full-line speed OC–12 connections . . ."). In late 1997, AT&T itself introduced and invested in the first phase of a robust IP backbone designed to deliver both dedicated and dial-up IP-based services. *See* "AT&T IP Backbone: Giving Business the Edge," October 1997, *www.att.com*.

[2] Qwest Corporate Release, April 13, 1998

[3] BancAmerica Robertson Stephens, Network Industry, February 23, 1998; Bear Stearns Industry Update, March 30, 1998.

Indeed, the very companies that the RBOCs would claim to assist—online service providers—have seen through the RBOCs' petitions and do not support them. This alone should make policymakers take notice. For instance, a group of retail ISPs (APK Net, Cyber Warrior, Helicon Online, Inforamp, Internet Connect Company, Javanet and Proaxis), who collectively serve over 80,000 end users, told the Commission: "the retail Internet service providers (ISPs) filing these comments agree that the public interest would be served by rapid deployment of high-bandwidth Internet access to residential and small business customers on affordable terms. *We could not disagree more strongly, however, with the idea that the particular relief that the RBOCs seek will advance that goal*" (Comments, p. 2, emphasis supplied). Likewise, the Commercial Internet eXchange Association, which represents over 150 ISPs who handle over 75% of the United States' Internet traffic, states: "Internet competition and innovation is best served through a regulatory structure that permits broad access to the incumbent LEC's network. *Bell Atlantic's approach, by contrast, would close its network to competitive providers*" (Comments, p. i, emphasis supplied)

What has become clear in the two years since the Telecom Act was passed is that, for at least the foreseeable future, the only path to broad competition for virtually all residence and most business customers is the resale and unbundling of the incumbent local exchange carrier's (ILEC's) local network. Competitive local exchange carriers (CLECs) will need full and fair access to those ILEC facilities if broad competition is to emerge. This is the case not only for "plain old telephone service," but for advanced services as well, because the building blocks of advanced services such as ISDN and xDSL include the very same ILEC local loop and, separately, the ILEC local switch used for routing of voice calls over the public switched telephone network. In addition, specialized network elements such as modems must be unbundled in order for CLECs to offer advanced services.

The RBOCs ignore this simple fact, asking that they not be required to offer these new services to their competitors via purchase of unbundled network elements or resale at any price. Their purported justification for this requested relief is that its incentive to make the necessary investments will be dampened if it is required to share the "reward" from the success of these services. As noted above, however, this ignores the fact that these services utilize facilities and equipment in the RBOCs' existing local networks which are "network elements" and to which CLECs have a statutory right to gain access. Thus, granting the requested relief would not create the investment incentives that the RBOCs claim, but would instead enable them to behave in an unchecked, anticompetitive manner.

In fact, the RBOCs do not need the requested relief in order to deploy advanced services in their home territories. They are already investing heavily today in installing broadband capabilities in selected markets in major metropolitan markets. Ameritech is already offering ADSL service in two cities (Ann Arbor, MI and Royal Oak, MI) and has said this service will be offered to 7 out of 10 Ameritech local phone customers over the next 2½ years.[4] Bell Atlantic has recently committed $1.5 billion to investing in broadband capabilities and awarded contracts to five vendors. This is also the case for U.S. West, which has announced plans to roll out DSL service in Phoenix, AZ beginning this summer and to extend it to other selected markets by the year 2000.[5] U.S. West Communications' President recently told the financial community that U.S. West's strategy is to focus on building its data business targeted at high growth "Internet oriented" cities such as Denver, Minneapolis, Phoenix and Salt Lake.[6] These activities demonstrate that the requirement of forward-looking cost-based pricing is not inhibiting the RBOCs' investment. Rather, they simply do not want to share their incrementally-priced services with their potential competitors, even though their low incremental costs are a product of their monopoly plant.

In fact, giving the RBOCs the freedom to act to foreclose competition will extend well beyond Internet services, and will include voice, fax, data and any other service and application carried over traditional local exchange technology as well. As the RBOCs well know, a high-speed access connection to the home or business that is the subject of its petition is entirely capable of carrying all of a customer's traffic, including voice. Once a home or business purchases such access connections, there is no need for it to maintain a separate telephone line or service for its voice/fax/data calls. To the contrary, the higher bandwidth connections already provided by the RBOCs in the form of ISDN and their planned use of DSL utilize the customer's existing twisted copper pair loops (as also requested by CLECs), and accomplish

[4] PR Newswire via Dow Jones, April 16, 1998
[5] Dow Jones Newswire, April 20, 1998.
[6] Communications Daily, March 23, 1998.

their greater speeds and capacity through conditioning of these loops and equipping them on either end with high speed modems (ISDN or xDSL). There is thus no need beyond this high speed line for the customer to retain (or purchase) other standard phone lines, because all of his/her traffic can be accommodated over the bigger "pipe."

By receiving forbearance to offer these services, the RBOCs would thus "raise the stakes" in the local exchange market, by being able to offer uniquely both traditional and advanced services over one "deregulated" pipe, free of resale, unbundling, pricing and other reasonable obligations before there is any meaningful competition in the local market, and thereby choke off local exchange competition before it can even emerge. In fact, Bell Atlantic has acknowledged as much in its opposition to the proposed WorldCom/MCI merger. There, Bell Atlantic has argued that the merged entity could exert monopoly power over Internet backbone facilities and has stated that the appropriate relief would be the adoption and enforcement of conditions on the merger similar to the requirements of Section 251.[7]

The RBOCs Have Not Complied with Sections 251(c) and 271 For Even Basic Telephone Service.

Thus it is critical that the Commission ensure that the requirements of the Telecom Act are implemented as the Congress intended, not evaded. The 1996 Act requires the RBOCs to open their local monopolies to competition before they are allowed to provide interexchange services. The RBOCs' extraordinary resistance to that mandate is well documented. It has been extremely difficult, both from a technical and economic perspective, for CLECs to obtain the network elements from the RBOCs that they require to create their own high-speed services.

Bell Atlantic's petition to the FCC exposes its long-standing adamant refusal to provide DSL capable loops to its competitors. Despite the clear finding in the Commission's *Local Competition Order* that the definition of unbundled loops must include loops "conditioned to . . . provide services such as ISDN, ADSL, HDSL, and DS1-level signals" (¶ 380), Bell Atlantic has steadfastly refused to provide such loops to its competitors. The pre-merger Bell Atlantic took the position that because HDSL and ADSL services were not commercially available on a retail basis to Bell Atlantic's end user customers, it had no obligation to make HDSL and ADSL-conditioned loops available as an unbundled network element. Subsequently, Bell Atlantic agreed to make such loops available only after it was already offering HDSL or ADSL services to its end user customers. Now, on the heels of an announcement regarding an alliance between the BOCs and the computer industry which will both ease and reduce the costs of deploying ADSL (*"PC, Telecom, and Networking Industry Leaders United to Deliver Ultra-Fast Internet Access to the Home,"* Press Release, January 26, 1998, www.uawg.org), Bell Atlantic filed its Section 706 petition which, among other things, seeks an exemption from the requirement that it make the critical electronics of these services available to competitors and from the resale requirement for the xDSL services themselves. Bell Atlantic's flagrant attempts to avoid its obligations under the 1996 Act should not be rewarded.

Indeed, CLECs cannot even get access to the underlying "raw" unbundled network elements—the local loop is one example and the local switch is another—from the incumbent LECs at reasonable underlying economic costs to provide basic POTS services, much less the new generation of high capacity services. For example, in violation of the terms of its interconnection agreements in a number of states and in breach of its obligations under the Act to provide nondiscriminatory access to unbundled network elements, Bell Atlantic has unilaterally attempted to impose inefficient collocation requirements on all CLECs for the purpose of combining unbundled network elements. Not only is this requirement unlawful, but Bell Atlantic's record of making collocation available is abysmal. For instance, in Maryland, Bell Atlantic offers physical collocation in only 26 of its 207 central offices and virtual collocation in only 7 others. It routinely represents that it has space constraints in many of its central offices and in other central offices, its provisioning intervals are unduly lengthy. In the pre-merger Bell Atlantic states, for instance, Bell Atlantic's collocation interval is 120 business days.

In addition, Bell Atlantic's operational support systems ("OSS") are woefully inadequate. BA-NY, for example, has not made available all of the technical specifications, business rules, and other technical and administrative information necessary for CLECs to complete the necessary OSS interfaces, and testing of Bell Atlantic's

[7] *In the Matter of Applications of WorldCom, Inc. and Howard A. White, Trustee, for Transfers of Control of MCI Communications Corporation and Request for Special Temporary Authority*, CC Docket No. 97–211, Petition of Bell Atlantic to Deny the Application of WorldCom or, in the Alternative, To Impose Conditions, filed January 5, 1998, p. 2.

OSS in the pre-merger Bell Atlantic states has shown that Bell Atlantic is unable to handle even a minimal amount of orders, much less the volumes required for competitive entry. The inability of CLECs such as AT&T to obtain the elements necessary to provide traditional telephony services forecloses their ability to compete with Bell Atlantic for those services, let alone for the advanced digital services which are the subject of Bell Atlantic's petition.

In contrast to the severe difficulties of gaining access to network elements and securing reasonable and affordable collocation just for traditional telephony services, the RBOCs and other ILECs can easily deploy advanced telecommunications services by inserting electronics and modem cards directly into their central office switches or as adjuncts thereto and thus gain the efficiencies and cost savings of integrated services. As long as the ILECs can integrate these new services into its embedded plant and equipment, they will have an inherent competitive advantage over new entrants, advantages that the 1996 Act requires be shared among competitors. This advantage is readily acknowledged by Bell Atlantic in its White Paper:

> The Bell Companies have some of the right incentives to invest in these [high-speed digital access] technologies. They allow the telephone companies to earn new revenue out of existing plant with only incremental costs. This helps them avoid deploying costly new transmission facilities. (Attachment 2 to Bell Atlantic's 706 Petition)

It is this critical aspect of the monopoly LEC's network—the fact that it, and it alone, can offer the scale and scope (and resulting lower unit costs)—that underlies the unbundling and resale obligations of Section 251 of the 1996 Act. If emerging competitors are forced to replicate the ILECs' networks in toto, from scratch—especially when they start with no embedded customer base—they will never be able to enter the market with competitive offers and competitive prices.

The RBOCs are well aware of the leveling effect of Section 251's pricing requirements. It is precisely to take advantage of its inherent economic advantages that they ask to be relieved entirely from any resale and unbundling obligation for advanced services. However, the very purpose of Section 251 is to require the ILECs to share their network efficiencies with their potential competitors. This is entirely appropriate, because the ILECs developed and deployed their networks on monopoly revenues. Although Bell Atlantic boasts that almost 94 percent of its switches are digital, it has SS7 capability on at least 94 percent of its lines, and it has deployed packet-switching capabilities in nearly 40 percent of its end offices, it neglects to mention that all of these improvements have been funded by protected monopoly revenues from local exchange and exchange access services.

Freed of the Section 251 unbundling and resale obligations, Bell Atlantic could load the bulk of its network costs onto its regulated entity, continue to receive monopoly returns on those costs, and price its advanced telecommunications services to its end user customers on the basis of incremental cost alone. At the same time, it would not have to offer the "advanced" unbundled network elements or wholesale services *at all* to its competitors (let alone at cost-based rates). This would eliminate any possibility of local competition in Bell Atlantic's territory, leaving Bell Atlantic free to offer less desirable services at inflated prices. (Notwithstanding the relative ease of deployment of ISDN for an ILEC such as Bell Atlantic, the ILECs have been painfully slow in implementing this 20-year old technology in their territories). Such a result is plainly contrary to the overarching mandates of the Act and any notion of the "public interest." In stark contrast, the interexchange marketplace offers these same and more advanced technologies—stimulated by a robust competitive market and not cushioned by monopoly revenues. These healthy investment decisions—and their associated risks and rewards—should not be distorted by allowing an incumbent monopolist to leverage that power and stifle emerging local competition, let alone to leverage that power into the interexchange market.

Extending the RBOCs' Market Power Into InterLATA Internet Services Will Not Create A More Competitive Internet Backbone Market.

Allowing the RBOCs to provide interLATA Internet services will not create a more competitive market for Internet backbone services. Bell Atlantic's purported justification for its request for a waiver of Section 271—that the Internet backbone suffers from severe network congestion and that Bell Atlantic's entry into that market would solve that capacity problem—is not accurate on either count.

Any congestion on the Internet backbone facilities pales in comparison to the degraded throughput that users experience due to choke points in the local network resulting from the ILECs' failure to upgrade their local facilities to accommodate broadband services. Indeed, Bell Atlantic is one of many ILEC commenters that warned the Commission of the threat of local "network congestion" as a result of the paucity of packet-switched local access alternatives.

Bell Atlantic's own White Paper explains that congestion can occur in the local access facilities, the Internet Service Provider's ("ISP's") equipment or interconnection facilities to the Internet backbone, and specific websites and connections to the websites, as well as on the Internet backbone transport facilities. As to the Internet backbone, congestion can occur at the Internet Network Access Points, where peering arrangements (or the lack thereof) can cause Internet connections to fail. Congestion on the Internet backbone's transport and routing facilities themselves is only one minor source of strain on the Internet, is being resolved by the significant investment noted earlier (at page 2) and is not a problem that requires entry by a monopoly RBOC to address.

Despite this dramatic investment, Bell Atlantic claimed in its petition that congestion on the Internet backbone's transport facilities has slowed transmission speeds to 40 Kbps. Bell Atlantic's claim is based on a highly controversial index.[8] In fact, there is ample evidence that the Internet is fully capable of carrying traffic at speeds that well exceed 40 Kbps. AT&T's own cable modem trials were conducted at average speeds of 400–700 Kbps. The cable ISP, @ Home, advertises that it typically operates at speeds in the range of 1,500–3,000 Kbps.[9] Time Warner's cable modem service in San Diego also operates at significantly higher speeds—10 Mbs downstream and 1.5 Mbs upstream—which Time Warner claims that its users are fully capable of achieving.[10] The ubiquity of these successful broadband trials confirms the availability of average speeds over the Internet backbone well above the maximum available over the local loops of Bell Atlantic (i.e., 56 Kbps), and strongly suggests that any congestion experienced by customers is in the ILECs' local loops, which plainly have not been upgraded to meet demand.

So long as the RBOCs retain a dominant market position in the local exchange, their entry into the interexchange market has much more potential to impede competition than foster it. Bell Atlantic is unabashed in its plans to leverage its market power. According to Bell Atlantic, allowing it to provide Internet backbone services would expand Bell Atlantic's ability to sell other complementary products to consumers. These include not just xDSL services, but also the second or third lines that consumers often seek for their Internet services. Additional incentive to invest would come from the resulting boost to Bell Atlantic's own Internet-access service itself, which has been uniquely hobbled by the fact that the customers of Bell Atlantic, unlike other providers, must obtain a separate interLATA provider.[11]

With the ability to bundle Internet services with both advanced and traditional basic telephone services (relief that Bell Atlantic implicitly requests), Bell Atlantic would foreclose competitors in each of these markets from constructing a viable competitive offer. No Internet provider or CLEC could compete with a Bell Atlantic offer of free Internet service with purchase of a DSL service. And that arrangement would not alleviate the Internet backbone congestion problem that Bell Atlantic cites as its justification to enter the market free from any restrictions on its existing market power in the local exchange.

The Act Wisely Provides that the Commission Cannot Forbear from Fully Implementing Sections 271 and 251(c)

The RBOCs do not dispute that Sections 251(c) and 271 of the Act, by their terms, prohibit them from providing both local and interLATA broadband services in the manner they propose in their petitions to the Commission. Instead, they argues that Section 706 of the 1996 Act permits the Commission to eliminate any and all statutory requirements the Act imposes on carriers, including Sections 251(c) and 271, so long as the Commission acts in the service of advanced telecommunications.

This argument is foreclosed by the plain text of the Act. Section 706 provides that the Commission shall "encourage" advanced telecommunications services through, among other tools, the Commission's "regulatory forbearance" authority. This is plainly a reference to the Commission's authority under Section 10, a new section in the Communications Act which the Congress created as part of the 1996 Act to waive regulatory or statutory requirements under specific circumstances. In Section 10, the Congress *expressly excluded* the power to waive the requirements of Sections 251(c) and 271, as follows:

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[8] Petition at 13 and Attachment 2, p. 22. Several Internet access providers have criticized Bell Atlantic's source, Keynote System Inc. Backbone Performance Index. *Inter@ctive Week,* "Backbone Survey Takes on Keynote," February 23, 1998. One such provider, Net Access Inc., plans to use different methodology to measure Internet backbone performance; the results of this study, expected this month, should be materially different. *See* www.netperf.net

[9] *See www.home.net.*

[10] BancAmerica Rebertson Stephens—Network Hardware Research Group, "The First Mile—Release 1.4," February 23, 1998.

[11] Petition at 16.

> Except as provided in section 251(f) [which pertains to small rural carriers], the Commission *may not forbear* from applying the requirements of section 251(c) or 271 under subsection (a) of this section until it determines that those requirements have been fully implemented.

Section 271 itself also confirms that Section 706 did not give the Commission authority to waive its requirements. First, Section 271(a) provides that the terms of that section—and that section alone—govern BOC provision of interLATA services.[12] Second, Section 271(d)(4) states that "[t]he Commission may not, by rule or otherwise, limit or extend the terms used in the competitive checklist set forth in subsection (c)(2)(B)," yet that is precisely what Bell Atlantic is asking the Commission to do. Even if, as the RBOCs suggest, Section 706 stands on its own, its general terms are not broad enough to support a waiver of Sections 251 and 271 when those specific sections have been otherwise placed beyond the Commission's forbearance authority.

The RBOC's Request Would Undermine Congressional Policy To Promote A Robustly Competitive Telecommunications Market.

Not only would Bell Atlantic's petition, if granted, run counter to the statutory scheme established by Congress for opening of RBOC local exchange monopolies and RBOC entry into interLATA markets as discussed above, it is entirely inconsistent with Congressional mandates, Commission policy and the public interest.

First, Bell Atlantic's broad request for special treatment for the provision of "high-speed broadband services" runs counter to the pro-competitive, technology-neutral policies of the 1996 Act. In other contexts, the Commission has adopted a technology-neutral policy to allow the marketplace to direct the advancement of competitive services.[13] In contrast, Bell Atlantic's proposal would free Bell Atlantic to direct its investment decisions to its new technology services to the detriment of its traditional services—the latter of which would be the only ones available to its potential competitors for purchase of UNEs and for resale. Thus, both Bell Atlantic's competitors and end user customers would suffer from the lack of competitive alternatives resulting from the grant of technology-focused (and not competition-focused) relief.

Second, Bell Atlantic's claim that "Section 271 is not undermined or compromised by allowing the limited interLATA relief sought here"[14] is simply untrue. Contrary to its assertion that it is requesting limited high-speed data relief, as discussed herein, grant of the requested forbearance authority would enable Bell Atlantic to provide *all* telecommunications services to its customers on an interLATA basis, including voice, video, fax and data over the same broadband pipe. Having achieved *de facto* 271 relief, Bell Atlantic would have no incentive whatsoever to meet the competitive checklist to implement local entry. Bell Atlantic's self-serving assertion that it "would not have agreed to the merger commitments if its strategy were to defer achieving checklist compliance" is as meaningless as it believes its merger obligations are. As AT&T has demonstrated in its pending Section 208 complaint proceeding before the Commission, Bell Atlantic has violated its merger obligations, and its interpretation of those obligations would render them a nullity.[15]

Furthermore, Bell Atlantic's claim that it "does not have the same alleged anti-competitive potential or unfair or special advantages entering the Internet and high-speed data market the Commission has thought Bell companies might have entering the regular long-distance market"[16] is plainly wrong. Bell Atlantic may well provide Internet access service to only a small portion of the subscribers to all Internet access services, as it claims. However, it provides local service to virtually 100 percent of the Internet subscribers in its territory, and connectivity to virtually all the

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[12] 47 U.S.C. § 271(a) ("Neither a Bell operating company, nor any affiliate of a Bell operating company, may provide interLATA services except as provided in *this section*.") (emphasis added).

[13] *See, e.g., In the Matter of Federal-State Joint Board on Universal Service*, CC Docket No. 96–45, Report and Order, FCC 97–157, rel. May 8, 1997, ¶¶ 47–49 ("Universal service support mechanisms and rules should be competitively neutral. In this context, competitive neutrality means that universal service support mechanisms and rules neither unfairly advantage nor disadvantage one provider over another, and neither unfairly favor one technology over another").

[14] Petition at 19.

[15] *AT&T Corp.* v. *Bell Atlantic*, File No. E–98–05, (complaint filed Nov. 4, 1997). For example, Bell Atlantic has taken the position in the complaint proceeding that its obligation to propose prices for UNEs based on forward looking economic costs applies only to proposals first made after August 14, 1997, despite the fact that the *Merger Order* states that "Bell Atlantic's and NYNEX's proffered commitments, and the conditions we impose, are not limited to interconnection agreements that are executed after approval of the Merger." *In the Applications of NYNEX Corp. Transferor and Bell Atlantic Corp. Transferee For Consent to Transfer Control of NYNEX Corp. and Its Subsidiaries*, Memorandum Opinion and Order, File No. NSD–L–96–10 (Aug. 14, 1997); *see also id.* ¶185; *id.* n.347; *id.* Appendix C, Condition 9.

[16] Petition at 20.

ISPs in its territory. Thus, every Internet access customer and virtually every ISP is also a customer of Bell Atlantic's monopoly local services. Accordingly, Bell Atlantic could easily and quickly market a bundled offering to its existing customer base—one that no ISP, CLEC, or IXC could match, especially if Bell Atlantic succeeds in having its "packet-switched" services sheltered from interconnection and resale requirements, with severe anti-competitive consequences for those competitors

Finally, Bell Atlantic's reliance on the existence of cable, wireless and satellite services as viable competitive local service alternatives is grossly premature. Alternative broadband technologies are not likely to compete with any ILEC-offered DSL services in the near term. According to International Data Corporation ("IDC"), ILECs have "a fair amount of breathing room with respect to introducing DSL service" because cable companies have not been able to deploy cable modem technology either quickly or ubiquitously, obtaining only 100,000 cable modem subscribers by the end of 1997.[17] Additionally, "the cost of the required access network upgrades to support modem service will hold back wide availability of cable modem service" as cable operators install fiber in their access networks at a fixed cost that IDC estimates to be on the order of $100 billion to cover all of the cable systems in the country.[18] "Cash-strapped cable companies will require years to perform these upgrades, with the result being that cable modem service will be available only in pockets across the U. S. In contrast, DSL does not require massive investments to upgrade the access network."[19] Thus DSL can be provided on a phased basis as customers demand the service.

Any real competition from satellite and wireless companies, particularly for two-way interactive services, is still years away as well, as those technologies have yet to be developed and broadly deployed.[20] This suggests that Bell Atlantic (and the other ILECs) are in a powerful position to hold back the introduction of broadband services to business and residential customers until the emergence of real competitive alternatives, and thereby *delay* rather than hasten their market introduction.[21]

The ILEC Must Divest Any Entity That Provides Advanced Telecom Services, Before That Entity Can Be Deregulated

If the RBOCS are serious about obtaining regulatory relief of the scope suggested in their 706 petitions, the Commission may want to explore the possibility—suggested by both Level 3 and LCI in their comments opposing Bell Atlantic's 706 petition—of allowing the ILECs to create a separate company for the provision of advanced telecom services. As Level 3 explained, for such a company to be truly separated from the ILEC's existing operations—in essence for the company to be on a truly equal footing with CLECs—it must be a totally divested entity that is not commonly owned with the ILEC; that has a separate board than the ILEC; that must purchase access to UNEs and resale like any other CLEC; that can obtain no collocation that is not offered to other CLECs; that obtains the same pricing as other CLECs; that, in essence, comes to the market just like any other CLEC seeking access to the monopoly facilities of the incumbent monopolist, and is answerable to a board and shareholders that do not have mutual interests with the monopolist. Only upon such complete divestiture could the Commission conclude that such operations are indeed "separated" and conceivably consider granting the RBOCs regulatory relief for advanced services along the lines that they request.

CONCLUSION

The RBOCs' petitions, if granted, would stop competition in the local exchange market before competitors even gain a foothold; it would enable them to extend

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[17] IDC Report, "DSL Market Gains Direction," January 1998, p. 5.

[18] *Id.*

[19] *Id.* Bell Atlantic admits the lack of competitive broadband alternatives in its own filing: "Cable and wireless providers likewise have invested far less capital, and built far less network. Cable companies have deployed few switches of any kind, and have not linked in to the nationwide digital signaling system (SS7) at all. Only 10 to 20 percent of cable subscribers are served by networks that have been upgraded to support two-way traffic. Test of cable modems are under way, and a few companies already offer commercial service, but these initiatives remain small and localized for now. Only about 15 percent of cellular networks are digital. Wireless data services remain quite limited, expensive, and slow. Cellular Digital Packet Data (CDPD) services are being rolled out slowly, and are currently used by only about 10,000 customers." *Id.* at Attachment 2, p. 49 (footnotes omitted).

[20] IDC Report, p. 6.

[21] *See, e.g.,* Jupiter Study at 31 ("Currently, the RBOCs have a stranglehold on high-speed Internet access via leased lines by virtue of their ownership of the local loop. The RBOCs will have little reason to invest in ADSL for business use until businesses have options for high-speed access besides leasing T1 and ISDN lines").

their existing market power into the interexchange market, contrary to the express intent of Congress in adopting Sections 251 and 271 of the 1996 Act; and it would do nothing to address the real competitive concerns of the Internet backbone market.

Stripped of the superficial appeal of "bringing Internet services to the home," the RBOCs' Section 706 filings are nothing more than a request by monopolists to introduce new services into their existing monopoly market without any competitive safeguards, and to leverage their market power into the interexchange market as well. Surely the Congress did not spend a decade of effort to amend the Communications Act for the first time in 62 years, only to have the key provisions of the Act circumvented by the RBOCs' petitions.

Senator BURNS. Thank you.

Mr. Charles McMinn, president and CEO of COVAD Communications of Santa Clara, CA. Thank you for coming this morning.

STATEMENT OF CHARLES J. McMINN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, COVAD COMMUNICATIONS COMPANY

Mr. McMINN. Thank you.

Good morning, Mr. Chairman and Senators. And thank you for the opportunity to appear before you.

My name is Charles McMinn. I am the founder, president and chief executive officer of COVAD Communications. We are a CLEC that offers high-speed data services over existing telephone lines.

I am here today on behalf of the Association for Local Telecommunications Services, better known as ALTS.

COVAD is one of the first CLEC's to deploy digital subscriber line technology over a combination of our own facilities and ILEC unbundled loops. DSL technology provides broadband access at 1.5 million bits per second, 50 times faster than a normal analog modem. And the technology works over almost all of the 150 million copper phone lines in the United States.

COVAD exists today because of the Telecommunications Act of 1996. In the last 9 months, we have deployed the Nation's largest DSL network, passing over 1 million homes and businesses in the San Francisco Bay area. Next year, COVAD's services will be available to over 20 percent of American homes and small businesses. That is, provided that the ILEC's stop hindering our growth.

Policymakers must examine the ILEC's dealings with CLEC's like COVAD. The issue is not that the ILEC's must be allowed to provide broadband services because no one else will. The issue is that the ILEC's are delaying and preventing others from doing so. The following actions are needed to eliminate the obstacles ILEC's have placed before CLEC's trying to deploy broadband services, as COVAD is.

First, the regulators must require ILEC's to allow CLEC's to physically collocate equipment in all ILEC central offices. Today, ILEC's generally require CLEC's to pay for the construction of an elaborate cage infrastructure prior to collocating equipment in a CO. Requiring this infrastructure is ludicrous, because it creates artificial scarcity of central office space and increases the costs of CLEC entry. Cageless collocation solves this problem, and should be offered by all ILEC's.

ILEC's have told us they can implement cageless collocation in 45 days at less than $10,000 per office. This is in contrast to over 100 days and $100,000 for cage-based collocation.

The cost and the time difference between cage-based and cageless collocation is frankly the difference between CLEC entry only in metropolitan cities such as Washington, DC., and rural towns such as Bozeman, MT.

Second, the ILEC's need to comply with the Act in provisioning DSL-compatible unbundled loops to CLEC's. Although providing CLEC's with DSL-compatible loops has been required since the Act, many ILEC's have not complied. For instance, Bell Atlantic's interconnection agreements explicitly state that these loops are not currently available.

Finally, even where these loops are available, the prices vary widely. It is nearly 10 times more expensive to order a DSL loop in downtown Houston than in downtown Chicago. Something is clearly wrong here. Price and availability must be more consistent on a national basis.

Third, The CLEC's must be free to deploy the latest generation of equipment in their collocation space. ILEC's currently drag CLEC's through a case-by-case determination of the functionality of such equipment, under an antiquated definition of what is and is not required under the Act.

Fourth, the ILEC's must provide CLEC's adequate access to their OSS systems, performance measurements and standards. I would like to commend the FCC for initiating a rulemaking on this issue last week. But from my first reports, it did not go far enough. I encourage the FCC to ensure that these OSS measurements and standards actively support robust and sustainable competition.

Fifth, ILEC's must offer CLEC's interconnection agreements that provide rigorous enforcement mechanisms that encourage contract compliance and provide quick and effective dispute resolution.

Despite these issues, the Telecom Act has clearly facilitated the growth of local competition. It has made COVAD and companies like us possible. In 1997 alone, CLEC's generated $2.7 billion in revenue on 1.4 million access lines. In the 2 years since the Act, CLEC's have raised over $14 billion in investment capital—7 times what was raised in the 4 years prior to the Act.

Mr. Chairman, Congress got it absolutely right in the 1996 Act. I urge you and other policymakers to stay the course and focus on the details in making the current laws work. ILEC's should not be relieved of their obligations under the Act through the back door of section 706. Instead, they should be held to the standards of performance Congress envisioned and the ILEC's themselves endorsed when the Act was passed.

I thank you for the time today and welcome questions.

[The prepared statement of Mr. McMinn follows:]

PREPARED STATEMENT OF CHARLES J. MCMINN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, COVAD COMMUNICATIONS COMPANY

I. INTRODUCTION

Good morning Mr. Chairman and Senators and thank you for the opportunity to appear before you to discuss section 706, the recent section 706 petitions filed at the FCC, and most importantly how these matters relate to the development of robust and sustainable competition in the area of advanced data services. My name is Charles McMinn and I am the founder, President and Chief Executive Officer of Covad Communications Company (Covad), a competitive local exchange carrier (CLEC) that offers high speed digital telecommunications services over existing local

telephone lines in competition with the existing incumbent local exchange carrier (ILEC). I am here today on behalf of the Association of Local Telecommunications Services, better known as ALTS. ALTS represents facilities-based competitors in the local telecommunications market offering voice, data, internet and other advanced technological services. In particular, I will discuss the realities of competition today as Covad and other CLECs deploy DSL technology in local markets nationwide and what actions must occur in order to bring true competition to the advanced data services market. But first let me tell you about my company.

Covad is a Silicon Valley-based CLEC that is focused on deploying packet-switched, high-bandwidth digital subscriber line (or "DSL") based telecommunications services in residential and business neighborhoods. In particular, Covad offers high speed access solutions that connect corporations to the home of employees who telecommute and businesses to their internet service provider. Our services provide communications speeds up to 1.5 million bits per second, fifty times faster than a normal analog modem. Covad is one of a new generation of CLECs that is intent upon the deployment of DSL-based telecommunications services over our own facilities or in combination with ILEC unbundled loops to residential areas and business districts.

Covad exists today because of the Telecommunications Act of 1996. Founded only nineteen months ago, Covad today employs almost 100 people, has raised over $150 million in capital, and has commercially deployed the nation's largest DSL network, which passes over a million homes and businesses in the San Francisco Bay Area. Last month, Covad announced that it will expand its network in 1998 to five additional metropolitan regions, including Boston, Los Angeles, New York, Seattle and the Washington, DC area. Since our business plan focuses upon providing service to remote "telecommuters" and internet service providers, Covad's network extends to residential areas. As a result, our entry is consistent with Congress's goal that advanced telecommunications services become available "to all Americans."

But now it is time for the ILECs to comply with the Act, the antitrust laws and the commitments they have made to companies such as Covad in interconnection agreements. If the ILECs fully comply with the letter and the spirit of the law and cease in engaging in practices that artificially restrict the scope of our entry into residential neighborhoods, competitors such as Covad and other members of ALTS will bring these advanced services to all Americans, as envisioned by section 706.

Unlike almost all ILECs—whose focus in this market appears to be limited to high end business customers, trials and calls for "regulatory relief"—Covad has already deployed DSL services extensively in a commercial setting in California. Unless unreasonably hindered by ILECs, Covad will be able to offer its innovative "always on" DSL services to over twenty percent of the homes and businesses in the United States by the end of 1999. And we will not stop there. Covad will be the first facilities-based carrier to enter more than half of the residential neighborhoods that we have targeted.

II. THE NATURE OF COMPETITION FOR ADVANCED TELECOMMUNICATIONS SERVICES

Covad supports the Congressional policy behind Section 706 of the 1996 Act. Indeed, Covad's sole goal is to make that policy a reality by deploying advanced telecommunications services rapidly throughout the United States. The best way to achieve this laudable goal is by ensuring that local competition can develop and thrive. Only the conditions of true facilities-based competition will lead to the rapid and continuous construction of state of the art, advanced telecommunications networks. It is clear from the explosive growth in the computer industry that "open platforms"—through which innovative competitors can develop new and rival hardware or software applications—best serve this economy's insatiable demand for computer processing power and information technology. Entrepreneurial companies like Covad seek to bring that same innovation and drive to the telecommunications industry.

Traditional, monopoly regulation can never replicate the conditions of a competitive market. Instead, regulation must focus upon ensuring that incumbent networks are open to competitive provision of services and removing the barriers that stand in the way of competitive rivalry in this industry. The 1996 Act was designed to promote competition, and now we must ensure that ILECs comply with this Congressional objective.

Covad views section 706 as a backstop to the major local competition sections of the 1996 Act. That is, if the other provisions of the Act, such as sections 251 and 252, once fully implemented, are somehow are not bringing about the congressional goal, then section 706 would come into play to see why we are falling short. That

is not the case today. Rather, ILEC actions to preclude competition is what is holding back the explosion of broadband services to all Americans.

Therefore, Covad strongly believes that ILECs should live up to the terms and conditions in the 1996 Act and current interconnection agreements. Sections 251, 252, 271 and 272—the bedrock competition provisions of the 1996 Act—remain the law of the land. If ILECs live up to the law and their commitments, no regulatory deals will need to be cut to ensure that broadband services be deployed.

As I will discuss more fully below, Covad's experience regarding physical collocation practices, and the availability and provisioning of DSL-compatible unbundled loops reveals ILECs have failed to comply with and fully implement the 1996 Act, especially as the Act relates to broadband services.

Therefore, while ILECs talk about competition and broadband deployment, they have no real idea of what robust competition is about. They rely upon placid, static methods of economic analysis, which virtually ignore the impact that a competitive market will have on innovation and deployment of new services. As Avram Miller, Vice President of Business Development of Intel Corporation stated "their strategy for tomorrow is to make teday last", Forbes Magazine, February 13, 1998. The ILEC section 706 petitions demonstrate that they long for the good old days of the monopoly dictating what is best for the consumer, controlling the destiny of advanced data services.

For example, ISDN technology has been around for over 20 years but widespread ILEC deployment came only in the past few years. DSL has been used by ILECs for several years to provide expensive services to businesses but ILECs have not focused upon residential, consumer DSL services until only recently. The ILECs fear of the uncertain in terms of market success and recovery of investment prevented these technologies from being deployed sooner.

Even today, ILECs approach deployment of these technologies with their monopoly mentality—a risk-free regime of guaranteed profits and return on investment. That simply is not how competitive markets work, and it is not the way to bring advanced telecommunications to market rapidly. Moreover, policy makers need to understand they have little leverage to change this mentality—the ILECs monopoly business incentives drive them to maintain the status quo. They will not jump at regulatory demands to junk their existing networks for advanced technologies even if they were totally deregulated.

In contrast, CLECs, like Covad, are willing and able to take the risk to bring advanced networks to market. What we need is for the regulators to stand tall and make the ILECs comply with the law. American consumers deserve a real advanced telecommunications future and not the "take-it-or-leave-it" tariff mentality that has traditionally dominated ILEC service offerings.

Therefore, I urge the policy makers at the federal and state level to examine the conduct and policies of the ILECs in their dealings with CLECs like Covad who seek to provide broadband digital telecommunications services on a competitive basis. More specifically, the policy makers should: (a) require reform of ILEC physical collocation practices; (b) ensure actual, nondiscriminatory access to unbundled local loops that support xDSL services and that these loops are offered at just and reasonable rates, terms and conditions; (c) remove the archaic restrictions on the functionality of equipment that may be collocated in ILEC central offices e.g., compact, state of the art equipment that can provide high speed data services; (d) ensure nondiscriminatory access to operations support systems; and (e) require competitive business level interconnection agreements. I believe that if ILECs faithfully and fully implement such steps, competitive providers of advanced services like Covad will emerge in all parts of the country, and advanced data services as envisioned in the Telecommunications Act of 1996 will be the reality.

Until these steps are taken, responsibility for delay in the deployment of advanced telecommunications services must be directod at the boardrooms and legal departments of the ILECs themselves, and not at the fundamental structure of the 1996 Act. I will now address each step in detail.

III. STEPS NECESSARY FOR COMPETITION IN ADVANCED BROADBAND SERVICES

Covad can build high-speed DSL networks throughout the ILECs' service territory if the ILECs would fully and faithfully implement the unbundling and collocation provisions of the Act. What stands in the way of the availability of DSL services "to all Americans" is not the 1996 Act, but the fact that the 1996 Act's provisions have not been fully or faithfully implemented by the ILECs.

A. ILEC Physical Collocation Practices Must be Reformed

CLECs such as Covad must physically collocate their equipment in ILEC central offices in order to provide DSL-based telecommunications services on a fully-com-

petitive basis. As a result, the goals of Section 706 of the 1996 Act will be served if the policy makers takes specific steps to ensure that physical collocation space for CLEC DSL equipment is readily available in all central offices at parity with the ILEC's placement of its own equipment and following a cage-less collocation model created by CLECs as they collocate in other CLECs' central offices.

The rates, terms and conditions of physical collocation are the critical elements in determining whether Covad's network is limited to high-density, urban areas or will it extend to low-density residential and even rural areas. It's been four years since the FCC's original order on collocation was released and we still have many issues that are yet to be addressed. I therefore recommend that the FCC act expeditiously on pending petitions in those dockets, some of which are almost four years old, and ensure that pro-competitive terms for physical collocation are included.

A particularly galling fact about current ILEC physical collocation practices is that most of the time and expense involved in collocation is wholly unnecessary. ILECs generally insist that when a CLEC requests collocation, the CLEC must pay for the construction of an elaborate "cage" infrastructure—a sometimes massive construction project that takes weeks, costs hundreds of thousands of dollars, and oftentimes involves asbestos removal, air conditioning upgrades and new bathrooms for the central office. These cages are large and imposing, ceiling to ground, 10 X 10 foot enclosures that are placed under lock and key. However, the advanced, next generation equipment Covad seeks to collocate is generally no larger then a night stand. Requiring that elaborate and expensive cages surround this equipment is ludicrous, and increases the costs of CLEC entry and makes it uneconomical for CLECs to enter less densely populated residential and rural areas.

I cannot stress enough the impact that ILEC physical collocation practices have upon providers like Covad. Covad requires "blanket" coverage in residential areas—to provide telecommuting and ISP services. For instance, to provide services in the San Francisco Bay Area, Covad will eventually collocate in more than 70 central offices, a network will stretch from the beaches to the mountains. Similar levels of collocation are needed in markets such as Boston and Washington, DC, and even more collocation is needed in New York.

Widespread, competitive broadband deployment can only be realized if ILECs are required to reform their medieval, cage-based physical collocation practices in a manner that would provide CLECs with more cost-effective and rapid collocation solutions including cage-less physical collocation.

The cost of traditional, cage-based collocation, often running up to $200,000 per office—which includes the cost of a cage and related infrastructure improvements that is inflected on the first CLEC that collocates—is generally unnecessary and wasteful and also creates an artificial scarcity of central office space. Covad has found that in as many as 15–20% of the central offices it seeks to collocate in—even and especially among residential offices in which Covad would be the first collocator—ILECs claim that no space is available for physical collocation.

These "no-space" assertions create competitive barriers because ILECs do not face the same exclusion from the central office when they place DSL equipment, cage-free, in those very same central offices. For example, although some of Covad's collocation applications have been denied in some Bay Area offices, Pacific Bell has since begun to provide DSL services from those offices—indicating that there is indeed space for DSL central office equipment, just not room for a cage.

Because our business plan involves offering "blanket" services to entire metropolitan areas, Covad immediately felt the unnecessary burden of the ILECs' cage-based collocation practices. But nationwide demand for collocation has increased dramatically since passage of the 1996 Act, and the Eighth Circuit's decision to require CLECs to "combine" unbundled network elements can be expected to increase collocation demand even further. As a result, current ILEC physical collocation practices are unnecessarily delaying the availability of innovative services to consumers. In addition, ILEC practices are making it so that a significant percentage of American residential neighborhoods and rural areas may never see the benefits facilities-based, DSL-loop competitors.

Covad has, with varying success, explored other alternative forms of physical collocation with the ILECs, including "cage-less" physical collocation. Adoption of "cage-less" physical collocation would permit CLECs to collocate DSL equipment in the ILEC central office in the same manner that the ILEC places its own DSL equipment in the office, subject to reasonable security arrangements such as card-entry systems and video cameras. Covad believes that only cage-less physical collocation provides CLECs with true parity in collocating equipment.

Based on its experience, Covad believes that cage-less physical collocation can be carried out by an ILEC in forty-five days and for non-recurring charges of less than $10,000 per office. Compared to more than one hundred days and $100,000 or more

for cage-based collocation, it is easy to see that cage-less physical collocation will prompt collocation by Covad and other CLECs in residential neighborhoods with far smaller populations that would be too expensive to serve under cage-based physical collocation. Not only can cage-less physical collocation solve the problem of the 15–20% of neighborhoods that are currently denied further facilities-based competition, cage-less also makes it possible for a CLEC like Covad to enter new markets rapidly and immediately serve bandwidth needs in those neighborhoods.

Cage-less physical collocation is clearly feasible. Indeed, cage-less arrangements are common between CLECs today when they collocate equipment on each other's premises. Divestiture-era cage-less arrangements between ILECs and AT&T remain in place in several central offices today.

In my opinion, the cost and time difference between medieval, cage-based collocation and modern, cage-less collocation is the difference between facilities based entry in downtown Washington, DC and Bozeman, Montana. Reducing the effective cost factor of collocation ten times would facilitate physical collocation in smaller, residential and rural areas.

B. DSL-compatible Local Loops Must Actually be Available on Rates, Terms and Conditions that are Just, Reasonable and Nondiscriminatory

Covad's business relies on obtaining from the ILEC unbundled loops conditioned to support DSL and other digital services. Unfortunately, the actual availability of DSL-compatible loops on an unbundled basis from ILECs is uncertain at best. Although unbundled DSL compatible loops has been the "law of the land" since August 1996 when first ordered by the FCC and later upheld by the 8th Circuit court, blatant non-compliance with this rule is rife throughout the country. And even when these loops are available, rates, terms and conditions vary. Therefore we request that the FCC investigate ILEC full compliance with the Order expeditiously.

Because of our business focus on DSL, Covad has discovered (to its dismay) that ILECs are routinely not making loops certified to support DSL services available to CLECs. Indeed, Bell Atlantic does not provide any CLEC with access to loops certified to support ADSL and HDSL services in any of its service territories. As a businessman, it is startling to find out that an American company such as Bell Atlantic is not only permitted to get away with this non-compliance and that they have no second thoughts about asking for even more.

Covad has made it a priority to break up this DSL-loop logjam and Bell Atlantic has fought Covad at every step. After months of laborious negotiations, Covad and Bell Atlantic last December signed one of the few agreements that eventually will allow Covad to obtain access to DSL-compatible loops in New York. However, when Covad sought to expand that process to other Bell Atlantic states, Bell Atlantic resisted. As a result, Covad was required to file for arbitration on this very same issue in Massachusetts only two months after the New York Agreement closed. This example is only one of many that demonstrate the trench warfare that ILECs engage in with carriers seeking to deploy broadband services.

To illustrate the breadth and gall of Bell Atlantic's efforts to deny CLECs access to DSL-compatible loops, let me road from Interconnection Agreements between Bell Atlantic and what I believe to be all facilities-based CLECs in Massachusetts:

> The parties acknowledge that ADSL is not currently deployed for use in the BA/Nynex network. BA/Nynex is conducting a technical trial that is due to be completed by the end of the first quarter of 1997. . . . BA/Nynex will share its interim findings and conclusion and consult CLEC regarding issues related to deploying ADSL. . . .

The comprehensiveness of Bell Atlantic's efforts to thwart DSL competition is impressive—by religiously inserting these clauses into every Agreement, Bell Atlantic has denied the citizens of Massachusetts the dynamics of a fully-competitive market for advanced, high-speed DSL services. Similar exclusionary clauses permeate Bell Atlantic's negotiated and arbitrated Interconnection Agreements in other states, including New York, Virginia and Maryland.

Needless to say, it would be utterly ridiculous to ever grant Bell Atlantic regulatory relief with respect to its DSL services before Bell Atlantic actually provides CLECs with unbundled loops certified to support DSL services as required by FCC Rules. The policy makers would be doing nothing but creating another slow moving, consumer hostile monopoly for broadband data services.

In addition, even where DSL-loops are available, prices for these loops vary widely—not by a few dollars a month, but by factors of ten. In Illinois, the monthly prices for Ameritech ADSL and HDSL loops are identical to the monthly prices for analog loops, ranges from $3.72 to $11.53. Loop rates in Texas are vastly higher, starting at $34.91 in urban areas. As a result, a DSL loop is nearly ten times more expensive in downtown Houston than in downtown Chicago. Not even the dif-

ferences in weather, geology, the cost of labor, and other cost factors can explain the radical price differences shown in this chart.

State	2 wire Analog Loop (High Density Zone)	2 Wire Digital xDSL loop (High Density Zone)
IL	$3.72	$3.72
MA	7.54	19.87
TX	12.14	34.91

Covad firmly believes that the cost of providing loops certified to support DSL services is substantially similar to the cost of providing loops certified to support analog, voice-grade services. Indeed, ILECs told the Commission prior to passage of the Act that the cost of loops certified to support BRI–ISDN services is fundamentally the same as the cost of loops certified to support analog services. Indeed the copper line used to support DSL is in most cases identical to the copper line used for analog service and that copper line has been paid for many times over by the businesses and residential ratepayers in every state.

I urge the policy makers at the federal and state level to investigate extensively the availability and prices of DSL-compatible loops. Along with physical collocation, DSL loop issues are, I believe, the primary stumbling blocks that keep CLECs like Covad on the sideline in several markets. The competitive provision of broadband, DSL services will be hamperod until these ILEC practices are reformed.

C. Archaic Restrictions Placed Upon Collocated Equipment

Archaic restrictions on collocated equipment forces CLECs into time-consuming delay and litigation and also forbid more efficient forms of network design. A clear, national principle is needed to prevent these delays and inefficiencies. In particular, the FCC's current rules have permitted ILECs to drag CLECs into state-by-state, case-by-case determinations as to whether a particular piece of equipment may be collocated in an ILEC central office. As a result, ILECs are able to add to the collocation process another time-consuming step that causes CLECs even further delay in constructing their network. These archaic rules predate the Act, and were created at a time when the FCC wanted to introduce competition to only limited segments of the market. The Telecommunications Act has dramatically expanded this definition of competition into all local markets, including those markets sheltered by the FCC in its original rules. Therefore the FCC should modify the collocation rules to reflect the requirements of the Act.

The wholesale restriction on collocation of all switching equipment should be revisited in the Section 706 context. For example, it should not apply to packet-switching equipment, such state of the art routers and ATM gear from companies such as Cisco, Ascend and Bay Networks . Deployment of packet-switching equipment in ILEC central offices—without concern that the ILEC will drag it through case-by-case determinations of the "functionality" of such equipment—would permit Covad and other CLECs building all-digital, data-oriented networks to freely utilize customized routing and other sophisticated functions that can make their networks more redundant, reliable and efficient.

D. Nondiscriminatory Access to Operations Support Systems (OSSs)

Inadequate access in operations support systems (OSSs) is yet another means to by which competition is stifled. In many cases, our interaction with the ILEC is in the form of a manual process but the same activities by the ILEC itself are completely automated. For example, when a CLEC places an order today for unbundled loops or even just a pre-order query of a customer record and potential due date, in many cases the order may have to be faxed to the ILEC and it can take days to get a return faxed response to the query. In other cases we enter our orders electronically in a crude 1970's era terminal screen, only to have the ILEC print them out and reenter them into their internal terminals, a process that leads to significant transcription errors. ILEC access to the same information is immediate and totally automated. This creates an extreme anticompetitive difference in the ability of new entrants seeking to provide services to customers. What we need to overcome this barrier are national standards to promote economic and efficient handling of the inter-company traffic and transactions needed to transfer customers between local carriers. I would like to commend the FCC for initiating a rulemaking on just this issue on Friday April 17 but from my first reports, it did not go far enough. I therefore encourage the FCC to ensure that these OSS measurements combined

with standards actively support robust and sustainable competition not just another data collection effort.

E. Business-Like Interconnection Agreements

Lastly, interconnection agreements between CLECs and ILECs oftentimes lack rigorous enforcement mechanisms that incent contract compliance and provide quick and effective dispute resolution. For example, there are oftentimes no effective penalties assessed on the ILEC if it misses the date for delivery of CLEC facilities or unbundled loops. However, I would bet that if an ILEC misses a delivery to one of its large retail business customers, there are significant commercial penalties embedded into these retail business contracts. The solution is to require the ILEC to include explicit contract language for compliance penalties and expedited dispute/resolution processes.

When Covad enters a market, we become a major customer of the ILEC. Indeed, in many instances the ILEC might not have seen revenue for that customer but for Covad's entry—such as when we hook up a person who has just started to telecommute or when we initiate service to a small business or library to the Internet. In a normal business environment, suppliers treat major customers well. Unfortunately, ILECs do not view CLECs in that way.

IV. THE STATE OF LOCAL COMPETITION TWO YEARS AFTER THE TELECOMMUNICATIONS ACT

While the above steps are, I believe, necessary to promote robust competition for broadband services, it would be remiss to discount the impact that the 1996 Act has already had upon the market. There is no doubt that the Telecommunications Act has facilitated the growth of local competition. Indeed, Covad would not exist without the collocation and unbundling provisions of the Act. The Act tore down or reduced many of the legal barriers that stood in the way. The Telecom Act can be viewed as the roadmap to competition for both voice as well as advanced data services. Already under the Telecom Act, customer needs are beginning to reshape the telecommunications industry and forge new models for serving the local marketplace.

The first evidence of this phenomenon is the creation—by CLECs such as Covad—of the nation's first local packet-switched digital telecommunications networks—in direct response to increased customer demand for broadband capabilities and advanced solutions.

Many ALTS members operate state-of-the-art networks with asynchronous transfer mode (ATM) backbones that support both ATM and frame relay services. In fact, CLECs today are among the nation's leading providers of frame relay.

To truly appreciate our progress, consider the great challenges we face. This has rightly been called a great business but not an easy one. Getting started effectively means going head-to-head with a financially potent monopoly. All facilities-based CLECs, such as Covad, must obtain interconnection agreements with the monopoly, a process which can take over nine months. From an operational standpoint, the CLEC and ILEC must work together on a day-to-day basis regarding collocation and access to unbundled network elements.

Moreover, facilities-based competition is highly capital intensive at the outset. Once the facilities are deployed, profitability hinges on achieving significant, volume dependent economies of scale which can only occur with a significant base of customers. Customers expect and demand high levels of performance and reliability in order to leave the comfort of the ILEC. And finally, competitors must contend with a perplexing array of multi-tiered regulation at the local, state and federal levels.

Yet, in a remarkably short time, the CLEC industry has scored impressive gains in bringing services and choice to the local marketplace. Today, there are over 100 competitive local entrants, including both facilities-based and resale providers. This number continues to grow and new Initial Public Offerings continue to be announced. Wall Street has viewed this emerging sector of the market as the future growth of telecommunications. Industry revenue reached $2.7B last year. Although relative newcomers, the CLECs closed 1997 with 1.4M access lines and analysts projected that this growth will double in 1998 to over 3M lines. Finally, as the leading indicator of Wall Street's confidence, the CLECs have raised over $14B in capital since the Telecom Act was passed. By contrast, for the four years prior to the Act, ALTS members only raised $2B. In other words, thanks in part to the procompetitive policies of the Telecom Act, CLECs were able to raise seven times the money in half the time.

Nevertheless, as the ILEC market statistics that follow demonstrate, the CLECs still have a very long way to go. Today, while our enterprise value for this emerging market is estimated at $26B, the ILEC enterprise value is $400B. Compared to our

$2.7B in 1997 revenue, the ILECs had $101B in 1997 revenue. While our access lines increased to 1.4M in 1997 and continue to grow dramatically, the ILECs had a total of 161M access lines, an increase of over 6M from 1996, and they are projected to increase in 1998 to over 168M lines.

These statistics prove that there is pent up demand for new feature functionality and services in the local telecommunications sector for all providers, both CLECs and ILECs, and, further prove that ILEC growth was not adversely effected by CLEC entry in the local market, in fact, quarter over quarter, ILECs continue to report record earnings growth. We believe it will be possible to further expedite our growth and thus speed the day when all Americans have a choice in local telecommunications services. Specific actions—such as cage-less physical collocation—would have an immediate impact upon the cost of entry into the market for residential broadband services. As a result, it is critical that all participants, including CLECs, ILECs, and policy makers at the federal and state level, understand and focus on the impediments to progress that I outlined above.

Competitive markets do not simply appear. To move from a market with only one player to a market of many players, entry must occur. The entry process—and the ensuing transition from the monopoly environment—is a process that does not occur overnight, or even in a few months.

Overseeing the transition requires breaking down the current barriers and avoiding giving the ILECs even more market power than they already hold, i.e., by eliminating pro-competitive regulatory requirements prior to robust and sustainable local competition for data services and enabling the ILECs to create yet another monopoly in the area of advanced data services.

V. CLOSING

As Chairman Kennard said recently:

> Government should not be forced to choose between less regulation or more bandwidth. The best way to ensure more bandwidth is to encourage local competition and some regulations that the Bell companies seek to overturn are designed to encourage that competition. . . . Communications Daily of April 17, 1998.

As a result, I urge the policy makers at the state and federal level to stay the course of local competition with renewed vigor. The competitive industry has come a long way in two years. Our success to date is a tribute to Congress, the regulators as well as to the entrepreneurs who started the business and took the risks.

But we still have a long way to go. Competition will be the only way to ensure that the advanced data networks American consumers deserve are actually deployed. Pre-mature long-distance entry or approval of the 706 petitions would reverse the tide of local competition that is just beginning to evolve.

Section 706 is a safety valve and was included in the Act to ensure advancement of data networks. If someone can conclusively prove that advanced data networks are not, can not and will not be built and that regulation is the reason then section 706 is the answer to ensure that advanced networks are deployed. I can tell you today that is NOT a fact—indeed, Covad's existence is testament to the fact that advanced, packet-switched data communications networks are being built today because the demand exists today. Deployment of similar networks would be more widespread to residential neighborhoods and rural areas but the ILECs themselves are withholding the tools necessary for that deployment.

Along with 706, the policy makers can solve these problems by continuing to utilize the section 271 long distance entry carrot over the ILECs. In fact, section 271 should be viewed as the Competition Assurance Prevision of the Act. The policy makers have so far performed their jobs properly and in a balanced fashion in regard to overseeing 271 applications. If we are to see these barriers to entry fall, we need to stay the 271 course and not allow the ILECs to displace the birth of competition in advanced data networks by exclusionary tactics once again in the local competition market.

Implementation of the solutions to the actions described above would, Covad believes, help bring the competitive provision of broadband digital telecommunications services to residential markets throughout the country. Responsibility for the seemingly-stalled deployment of advanced telecommunications services must be placed squarely on the ILECs alone. Delay can be attributed to the absence of a fully-competitive market—created by certain actions of the ILECs. The goal of the 1996 Act is to promote the deployment of these services to all Americans in a competitive environment.

Covad believes that American consumers deserve no less than the most robustly competitive and rivalrous "market for telecommunications bandwidth" in the world.

Blatant barriers to entry must not be allowed to stand. Failing to ensure a competitive environment would condemn the deployment of crucial next-generation digital communications services to the unfettered whims of the ILECs—precisely the opposite of what Congress intended Section Sections 251, 271 and 706 to accomplish.

I thank you for this time today and welcome questions.

Senator BURNS. Thank you, Mr. McMinn.

Mr. Joseph Zell, president, !nterprise Networking Service, Denver, CO, thank you for coming this morning.

STATEMENT OF JOSEPH R. ZELL, PRESIDENT, U S WEST !NTERPRISE NETWORKING SERVICE

Mr. ZELL. Thank you, Senator. And thank the rest of you for your time.

My role at U S West is to run our data networking and Internet services division. And every day, all I wake up thinking about is how we can develop and get some of these new data services deployed. So I want to tell you what the reality is in my territory. I will not try and speak for the other RBOC's, but I think it is important that you hear what I really face as a business leader on a day-to-day basis, trying to get these services deployed and get them out to market.

First off, my focus is on the customer. My division represents a product development engine for U S West, and my job is to develop these new data services not only for the high-end business market, but also for the small business and the consumer marketplace. We are seeing extensive demand in our territory for high-speed, low-cost, ubiquitous Internet access connections to support a range of consumer, small business and large business applications, including telemedicine, work-at-home applications, and simple economy development of smaller towns. There is just no question in our mind that this is a huge opportunity for us and that we need to do everything we can to blow out the barriers that are standing in our way.

Let me try and clarify the problem from my standpoint. Let us, first, separate the market between the business marketplace in metropolitan areas, which is principally the focus of interconnectors and the CLEC's that are pursuing DSL deployments and the consumer urban, suburban and rural deployments necessary to really drive work-at-home, consumer-type high-speed data services deployment. We have absolutely developed a strategy within U S West, and a plan, to aggressively develop and deploy these services. Right now, I am deploying high-speed digital subscriber loop technology services into approximately 236 central offices in my territory, which will give us access to 4 million or 5 million homes passed, or about 40 or 45 percent of the homes in our territory over the next 2 months.

So do not take any of this to apply to U S West. We are aggressively deploying wherever we can make an economic, viable business case to do it. And that is the problem. We have to be able to separate this between metro areas, where it is easy to walk in and cream-skim some big business customers, and smaller towns and rural and consumer deployments that are a lot more difficult to serve.

Here are the challenges from my standpoint. The costs today are prohibitive to serve smaller cities and towns. And our geography

has more of them than anybody else does. Just to give you a point of reference on this, we serve about 307,000 square miles, about 3 times the RBOC average. And about 60 percent of the population in my territory is in non-urban areas. So the business problem I am trying to solve is how do I bring high-speed data services to the mass market at a reasonable price to really cover that entire market.

Here are the facts. For me to be able to bring these services to these less-dense areas simply is a lot more expensive. The Internet superhighway does not even have exit ramps in my territory. When you look at the region that we serve, 14 States, there are really only 9 cities with an onramp of DS III or above levels. So high-speed access to the direct highway does not exist in our territory. What it forces me to do is backhaul, or buy essentially dedicated facilities that I then have to carry on a dedicated basis across hundreds of miles, in some cases, to get to the nearest onramp. And it really drives up my costs of providing service.

Worse yet, because of the LATA boundaries that affect this, it causes me to do things that are capitally inefficient, route-inefficient. I am carrying things not as the crow flies, that would reduce costs and allow me to drive down the price to the consumer, but I am essentially building along regulatory lines instead of along economic lines.

From our standpoint, what it is really going to take here to create a solution is very targeted relief of a few provisions of the Telecom Act that are barriers to this robust deployment—very few changes.

First off, transport services for data and Internet connectivity, I need to be allowed to do it across LATA boundaries. It is simply not economically feasible for me to serve all of my territory and to get these high-speed data services out to all customers—which was the full intention of 706—without that.

At the same time, we need some assurance that we are not going to have these services unbundled and then be forced to resell them at big discounts, because it will simply put us in a position where I cannot get the capital that I need from the corporation. It is just a big disincentive for us to invest in new technology.

I want you to know that this new technology is here. This is the modem that goes in the customer's home. This will work on loops today about 18 kilofeet. We think it will be out to 22 kilofeet. We are putting this in the ground today. We have got services available in five of our cities today. And like I said, we will have it in 41 in our territory in the next 2 months. So we are dead serious about doing it. But I am only going to 236 out of 1,262 central offices.

So what that says is, we have got haves and have-nots. Eighty percent of the central offices in my territory I cannot afford to deploy to because my largest single cost outside of capital deployment costs are the backbone charges and backhaul charges necessary to get onto the information superhighway, which I am not allowed to participate in today.

So, from my standpoint, we are fully committed to deploying these services. We are seeking limited relief to allow us to do it. At the same time, we are fully committed to giving competitors ac-

cess to our unbundled loops, to our collocate space, to allow them to offer these services. But let us just keep in mind here, these competitors are not coming in, asking us for unbundled loops in Bozeman, MT. They are going after dense metro areas, where they can cream-skim. And that is not where I am headed with this service.

From my standpoint, the whole intent of 706 was to make it so that we would not have information haves and have-nots. I think that is exactly where we are heading. And what we are doing is we are jumbling up the opportunity for us to deploy high-speed data services to our consumer with all of these other elements of the Act that are really entirely unrelated.

So, from my standpoint, I think that it is really critical that we get this relief to be able to support these services. And I greatly appreciate the opportunity to talk to you about it and answer questions today.

[The prepared statement of Mr. Zell follows:]

PREPARED STATEMENT OF JOSEPH R. ZELL, PRESIDENT, U S WEST INTERPRISE NETWORKING SERVICE

Mr. Chairman and members of the Subcommittee, it is an honor to appear before you today to discuss Section 706 of the Telecommunications Act of 1996 and the critical need for wider deployment of advanced telecommunications services to customers in the U S WEST territory. My remarks will emphasize the following points:

1. Congress passed Section 706 of the Telecommunications Act to ensure that "all Americans" have access to advanced telecommunications technologies. By its plain words, Section 706 directs the FCC to lift any regulatory barrier that is preventing companies from investing in and deploying high-speed data technologies to the public.

2. The current providers of advanced data services are serving urban and business customers exclusively and are ignoring smaller and rural communities altogether. Rural Americans do not have access to an adequate data communications infrastructure and are at real risk of becoming technological "have nots."

3. U S WEST serves a larger part of the West and Midwest and a greater number of small and rural communities than any other carrier. It has the largest investment in communications infrastructure in its territory and it is uniquely positioned to bring the benefits of the Information Age to the currently underserved regions of the Nation. But regulatory barriers now prevent U S WEST from doing so. U S WEST is not allowed to build desperately needed data backbone in its territory because these networks are, by nature, long-distance facilities. And rules designed for the old telephone world discourage U S WEST from investing in new high-speed data technologies by requiring the company to turn all of its innovations over to its rivals.

4. U S WEST has petitioned the FCC to use the power Congress gave it to lift these regulatory barriers. Doing so will carry out Congress' intent to ensure that all Americans, not just those in big cities, receive the economic and educational benefits of high-speed data services. Consumer groups, educational institutions, rural legislators, and economic development authorities all support U S WEST's petition. The opposition is coming from carriers who are trying to keep U S WEST out of their markets, yet are refusing to serve the very communities who need these services the most.

U S WEST offers a full range of communication services including traditional, circuit switched telephone services, wireless communication services and advanced data networking services. Many communities and many Americans currently lack high speed Internet access, especially in U S WEST's territory. These communities and Americans are at risk of being relegated to information have nots in the 21st century.

U S WEST Communications' territory covers a 14 state area in the Western and Midwest regions of our nation. The following facts about the U S WEST region are striking:

1. We serve the largest territory of any RBOC—307,000 square miles, or nearly three times the RBOC average—yet we are the smallest in terms of the number of

access lines. Additionally, our household density is less than half the RBOC average.

2. Our top five Metropolitan Statistical Areas (MSAs)—Minneapolis, Phoenix, Seattle, Denver, and Portland—constitute only 33.3 percent of the total population within our territory. This compares with an RBOC average of nearly 41 percent. At least two RBOCs have about 60 percent of their populations crowded into their top five MSAs.

3. Based on 1995 population estimates from the U.S. Census bureau, Minneapolis—our largest MSA with about 2.7 million people—would be only the third-largest MSA in every other RBOC territory but one.

4. Less than 45 percent of our revenues are derived from our top five MSAs.

All of these factors make U S WEST's territory relatively less attractive for new facilities based competitors. U S WEST's position in its region makes us the most likely company to deploy advanced telecommunications and information services on a widespread basis to rural America, as Congress intended. U S WEST is by far the largest local exchange carrier in its fourteen states, and unlike competitors such as AT&T who can pick and choose which customers they want to serve, we are required by law to serve virtually every residential and business customer in our service areas. In 1997, U S WEST invested $1.9 billion of capital to construct, improve, upgrade and repair the telephone infrastructure within our region. Moreover, we are committed to deploying advanced data networking and transmission services as broadly as possible throughout its region, and our roll-out of these services has been the most aggressive of any local exchange carrier in the nation.

Why is it important that everyone have access to these new services? Look at how the process of information gathering has changed. Information has historically resided in written materials—whether letters, books, or periodicals. The new information age has created a new medium to receive, send and review such material—the information highway, known as the Internet. U S WEST supports this evolution and believes that it is critical to the continued economic growth and educational advancement of the nation. To be meaningful, however, access to this new medium must be extended to many more people and in more diverse locations than it is today. The Digital Subscriber Line technology, known generically as "xDSL," which U S WEST is deploying in portions of its region is the ideal telecommunications vehicle to insure broader deployment of advanced telecommunications services, including access to high speed data transmission and the Internet.

Digital subscriber line technologies use customers' existing copper loops to provide high-speed data transmission without interfering with the carriage of voice. U S WEST currently offers one form of this technology—rate-adaptive asymmetric digital subscriber lines, or "RADSL"—under the MegaBit Services brand name. A MegaBit customer uses a special modem that creates a data channel on the loop apart from the existing voice channel. The customer's loop is connected to a second modem in the central office. The second modem sits in a shelf called a digital subscriber line access multiplexer (or "DSLAM") that directs the voice traffic to the ordinary circuit-switched network and routes the data channel to a packet-switched network. In the packet-switched network, data is routed between ATM or frame relay switches connected to each other by private lines, and then to a business site or to an ISP for routing to the Internet. With MegaBit Service, a customer's voice channel always remains operational even if the data channel is in use.

The existing telephone infrastructure is fully capable of supporting this next generation of technology—DSL—which will enable data to travel at speeds that are up to 150 times faster than the average dial up modem in today's state of the art personal computer. This means that the common experience of waiting at your computer for the screen to paint can be an annoyance of the past. Deploying this new technology, however, is not without significant investment and therefore risk to U S WEST, particularly outside the large urban areas in our region.

U S WEST believes that it is good public policy and sound business to increase the number of customers who have access to these new high speed data services. The Internet contains a wealth of information and resources for everyone—including students, professionals, retirees and the homebound. Further, high speed data transmission is the foundation for extending crucial services to people outside major metropolitan areas. For example, access to high speed data services will enable a doctor doing a residency in Alamosa, CO to consult with doctors at University Hospital in Denver, resulting in the delivery of excellent and timely medical services. Without this service, a patient would have to travel approximately 230 miles and incur unnecessary expenses and delays in treatment.

U S WEST firmly believes in and wants to deploy these high speed Internet and data services. But rules and regulations say it can not. U S WEST is not currently allowed to build a high speed data backbone in its region no matter how desperately

one is needed. Such deployment in the U S WEST region requires a very significant investment by the Company. To make this new investment possible and efficient, we have requested very targeted relief from a few provisions of the Telecommunications Act of 1996 that are acting as barriers to robust deployment. U S WEST simply wants the ability to transport DATA—not voice—across LATA boundaries and not to have to unbundle the non-essential pieces of our data network, or sell these new data services available to competitors.

While others have argued that this investment is not necessary by U S WEST because investments are already being made in the backbone, the inescapable fact remains that investment is not being made in many areas of our territory. For example, Qwest recently announced the launch of its national IP backbone, but it will serve only 20 cities in U S WEST's territory and it will totally miss 5 states—or 35 percent of our region. Similarly, IXC last week announced its launch of a national IP backbone, but again it misses the majority of the US WEST territory and touches only two states in our 14 state region.

U S WEST strongly supports and welcomes competitors to provide services it its subscribers throughout the region. For example, U S WEST has already negotiated a significant number of interconnection agreements with other carriers and has more under negotiation. But the critical fact remains that these competitors are targeting the metropolitan areas and large businesses and are not seeking to deploy advanced services to anyone outside large metropolitan areas. Granting U S WEST's petition for relief under Section 706 will go a long way toward fulfilling Congress' desire for widespread deployment of advanced telecommunications services . U S WEST has made by far the largest investment in telecommunications infrastructure of any carrier in its largely rural region—infrastructure that serves residential as well as business customers—and it is currently rolling out advanced high-transmission copper-loop technologies such as asymmetric digital subscriber lines (or "ADSL") on an aggressive schedule in forty three cities throughout its fourteen states. Outside that region, where the company is free from regulatory barriers that constrain its lines of business, U S WEST has demonstrated its capability to provide customers with a full range of advanced communications, networking, and information services, and its determination to compete for the opportunity to do so.

U S WEST has requested that the FCC grant it the ability to transport data traffic across LATA boundaries. Section 706 of the Telecommunications Act of 1996 clearly gives the FCC that power. Section 706 directs both the FCC and state commissions to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans," and to do so "by utilizing, in a manner consistent with the public interest, convenience and necessity . . . regulatory forbearance . . . or other regulating methods that remove barriers to infrastructure investment." Section 706(a) and (b) constitute an express grant of authority to the Commission and a statutory command to use that authority.

There is nothing in the words of Section 706 limiting which regulatory barriers the FCC is required to remove. Nor does the text of Section 706 contain any limit on the FCC's power to forbear from applying innovation-frustrating regulations, other than that it be exercised in the public interest. On the contrary, Section 706 speaks in broad and mandatory terms. State and federal regulators "shall" encourage the roll-out of advanced technologies by using regulatory forbearance and removing barriers to investment. And if the FCC finds, after inquiry, that "all Americans" are not receiving access to advanced services and technologies, "it shall take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment."

The companies trying to keep U S WEST out of their markets cannot point to any actual language in Section 706 that limits the forbearance power Congress gave the FCC or that excuses its duty to exercise it. Instead, they argue that the term "regulatory forbearance" is a coded cross-reference to another, unrelated section of the Act. This other section—Section 10—allows the FCC to forbear from enforcing rules that the development of competition has made unnecessary. Because this other section is concerned with the development of competition, it (and, by its express terms, it alone) cannot be used to forbear from Section 251 and 271, the market-opening provisions of the Act. But Section 706 serves a wholly different purpose; it addresses whether existing competitors are failing to deliver the advanced services and technologies essential to the Nation's growth and if so, directs the FCC to take appropriate action to facilitate wider deployment of advanced telecommunications services. It makes no sense to ignore the plain language of Section 706 and to frustrate its purpose by importing limitations that appear in an unrelated section of the Act and serve a totally different goal. And we very much doubt that Congress really meant that the FCC was directed to countenance application of any portion of the Communications Act in a manner that actually deprives customers of service.

All U S WEST is seeking , pursuant to the specific terms of the Telecommunications Act, is the ability to increase access to advanced telecommunications services—such as access to the Internet—to make life better for residents in our region. Section 706 is designed for one purpose—to prevent the development of technological "haves" and "have nots" as the Information Age progresses. We want the customers that reside in the less urban portions of our territory to be among the "haves" so they have access to high speed data and the wealth of information that resides on the Internet.

Mr. Chairman and members of the Subcommittee, thank you for the opportunity to appear today. I look forward to responding to any questions you may have.

Senator BURNS. Thank you very much, Mr. Zell.

We have been joined by two of my Colleagues. Senator Wyden, did you have a statement that you would like to offer?

Senator WYDEN. I will wait for questions, Mr. Chairman.

Senator BURNS. Senator Breaux.

Senator BREAUX. I will wait, Mr. Chairman.

Senator BURNS. Mr. Kerkeslager, I had a recent opportunity to see an OSS at work at Southwestern Bell. It seemed to me that, at that time, after spending a couple of hours and watching them go through their operation, you know, when we start unbundling and doing things like that, is that program not moving forward as fast with other RBOC's as was intended?

Mr. KERKESLAGER. Mr. Chairman, that is correct. Generally true across all RBOCs, the OSSs, the connections are not available in standard form. When they are, the capacities are very meager. But, most commonly, it is a paper process, leading up to the electronic process, which is supposed to be in place.

So, in fact, your summary is correct. It is not there. The process does not work at full capacity. You cannot handle the levels of demand that the CLECs want to deliver to serve customers.

Senator BURNS. Give me an idea of what the next step is. Now, after you enter their data base, what is the next step? Kind of walk me through that process, if you would, from your viewpoint. And then I am going to ask the same question of Mr. Zell.

Mr. KERKESLAGER. Very good. The whole picture of what we are talking about is to unbundle each of the monopoly elements. That was the essence of the Telecommunications Act, and that is the essence of the FCC's rules. The physical elements—to gain access to the physical elements, such as a local loop, you need to define a standard interface to that loop. That is a process that the industry undertakes. And that is relatively straightforward unless you are dealing with a monopoly that will not cooperate.

But I used the analogy in my testimony of the plug in the wall for the telephone jack. That part of it is exactly like that. Develop those standards. Then, when you want to actually obtain a loop from the RBOC, from the ILEC, you need to be able to exchange information between the incumbent carrier and the competitive carrier, to say: "This is the loop that I want to serve, will you please transfer the information about that to my data base so that I can have it and I can know where it is located and how I can connect to it?"

In that case of just talking about the local loop, that is the way an operating system would work. The ILECs need to provide the capacity to interface with that at a high enough rate of speed so that we can process enough orders to actually be in business. One or two customers a day just will not cut it in a competitive market.

Senator BURNS. Mr. McMinn, would you like to comment on that? Are you finding the same thing?

Now, I would ask both of you, before I get to Mr. Zell, I would ask both of you, does what you want to do, and to facilitate this, does this require collocation of equipment?

Mr. KERKESLAGER. Yes. Finishing up my comments on collocation, if you are going to be in the telephone set industry or the answering machine industry, you can sell products to the consumer that they can take home and plug into their wall, their telephone jack in the home. If you are going to be in the business of providing broadband loops, you need to be able to go into the central office and plug into the loop. And you need space to put your equipment.

That space is quite nominal; however, the requirements placed upon us are to build expensive cages, which reach up to the top of a 10-foot ceiling, and basically impose a huge cost even if we want to serve just 100 lines. So, yes, collocation is necessary, but under reasonable terms, conditions and prices.

Senator BURNS. Mr. Zell, you have heard their side of the problem. I would be interested in hearing—has the local loop, has the local carrier done anything to put in place equipment that would make the conversion so that they would not be necessary plugging into the wall in the home but plugging in at your facility without collocation of equipment?

Mr. ZELL. Let me start by saying that the challenge to ever have the RBOC's meet the standards continually elevated by the interexchange and competitive local exchange industries for interconnection is its own debate that could go on here for hours. They can say "Jump." I can say "How high? I can get that high." They will say, "You have to jump a little bit higher."

So I want to keep in mind, we have spent tens of millions of dollars building operating support systems and interfaces to enable this. We have many competitors today in our territory happily using our systems, processing many more than two orders a day. We would not have so many dead soldiers in our territory relative to competitive loss if that was not the case. So I do not believe that this is anything other than a continuation of the longstanding debate that it is a way of keeping us out. Because until we meet their standards, they will not suggest that we have met the checklist.

So, from my standpoint, that is a debate that could go on for hours. I do not think it is productive, in my opinion. But what I would focus on is that we have signed 270 interconnect agreements with 110 different companies. Each one of those companies today in those agreements has access to unbundled loops, has access to collocate space. And there are clearly processes in place to work with them to provide it.

The requests have not been that extreme, from my standpoint. I think that this continues to be a war of debate as opposed to somebody standing at our door with thousands of orders that we are just refusing to process.

Senator BURNS. How would you—I will just ask one more question—how would you characterize your OSS system? And at what point are you? Are you making progress to your satisfaction?

Mr. ZELL. Yes, I think that we have made a tremendous amount of progress. I would invite, you know, the analysis or review of

those interface capabilities for kind of the reasonable person test. I think you would see, as a reasonable person, that we are providing capabilities today to enable us, and that we are continuing to invest tens of millions of dollars to make it better, and better address the needs going forward of these wholesale customers.

Senator BURNS. Senator Rockefeller.

Senator ROCKEFELLER. Thank you, Mr. Chairman.

I, as I guess all of us here do—and Senator Wyden at least in part does—represent very rural areas. And perforce we need to look at everything we do in terms of the effect on rural areas.

Now, the section we are discussing, 706, is to encourage advanced services to all areas, and it is lain out that way. It seems to me that there are two challenges: What services, therefore, can be describod as truly advanced? And how do we get that to all Americans?

I would like you to comment on how you believe the petitions would treat rural areas, No. 1. And, No. 2, BusinessWeek has an interesting thing in which they say DSL customers basically need to be within 3 miles of a phone company in order to get that optimal DSL performance. You may have made reference to that, Mr. Zell. And I need to know, then, how that and a rural situation works.

One of the things that I would just point out to you, politically, is that the Senate, I think more than the House—certainly this committee—is predominantly a rural committee. Interestingly, this is also true of the finance committee. It used to be kind of an oil and gas committee and now it is sort of a rural committee. The same is true here.

Anybody who wants to walk out of this thing with something that is useful, has to be able to satisfy rural requirements. That is why you heard Senator Stevens and I both complaining, as a couple of you did, about the FCC not going far enough in what they asked for Universal Service.

Could you comment on the petition question and the 3-mile question, each of you, please?

Mr. ZELL. Can I go ahead and take that first, please?

First off, on what is advanced. From our standpoint, what is advanced is being able to take that copper line that is in the ground and enable it to run 256 kilobit, up to 7 megabit per second, on existing technology, on existing plant. So what we are talking about is high-speed Internet services over that local line, on top of your voice line, not instead of. So it is a data over voice kind of technology.

To be more explicit on what it is that we would like to do with relief, specifically what we would do is start looking at the construction of the kind of in-region backbone capabilities that would allow us to concentrate and aggregate our traffic and eventually acquire peer status with Internet service providers. Like I said, outside of the capital costs of buying this equipment, my biggest single cost for providing the service that keeps me from making it affordable—I could make it available anywhere, it is just I am not going to find anybody that wants to pay $200 a home to get it.

But if you want to be able to make this available to a home at $40 or $50 a month, which is kind of the market expectation, what

it is going to require is that I take my Internet backbone and backhaul costs down substantially. The way that I do that is by aggregating multiple data traffic types onto a common backbone facility, achieving peer status. The faster I can do that, the sooner that that line item in my income statement goes away or goes down dramatically. And that is how I drive costs out of this and get it available to a mass market, including rural customers.

Relative to the technology, this is first-generation stuff. The suggestion was that we have had it for 5 years. Rate adaptive DSL, we are the first ones to deploy, we think. And we just started deploying it in the last 6 months. So this is a relatively new technology, first-generation. Today it works on loops out to about 18 kilofeet. That is about 3 miles. Our belief is it will probably go out to 3.5 or 4, over some period of time. And, like anything else, if you see the whole industry start driving this technology into their plant, you will see lots and lots of technological innovation around it, to help us get further and further out at lower and lower costs.

So, from my standpoint, this is substantially responsive to the desire to provide low-cost, high-speed services to less-dense population areas, which, again, our territory is the poster child for. That is our point of view on it.

Senator ROCKEFELLER. OK, was it you, Mr. McMinn, who described San Francisco?

Mr. MCMINN. Correct.

Senator ROCKEFELLER. And that fits again within the 3 miles?

Mr. MCMINN. Right. I would like to address both of those points.

The point I would like to start with is that my biggest cost is not the cost of the bandwidth. That is a few dollars a month to backhaul bandwidth on a per-subscriber basis. That is not the issue. My biggest cost, No. 1, is the $100,000 entry fee to get into any central office, because of a cage.

Senator ROCKEFELLER. Because of what?

Mr. MCMINN. A cage, the collocation space that I am forced to acquire, even if I only want to serve a half a dozen customers out of that central office.

And the second highest cost to me is the ongoing price that I pay to lease the copper loop for the ILEC, which, in the State of Texas, is $46 in rural communities. In downtown Chicago, it is $3. I can go into Chicago. I can go into some of the more urban and rural areas of Illinois because the pricing is realistic. But in some States, the price makes the ability to service any customer prohibitive. And it is totally dependent on the price that the ILEC's charge to me.

On the issue of the 3-mile question, it is true that the DSL technology today works best out to about 3 miles. We have a solution that works well beyond 3 miles, but it requires the cooperation of the ILEC in provisioning additional equipment in the field—something that they would not like to have to offer me as an incentive if they were exempt from having to allow resale of certain sub-loop elements.

Senator ROCKEFELLER. Just before Mr. Zell has his legitimate chance to reply, we have set up here almost a classic chicken and egg-type situation. I will not do this unless you do that, or I am not going to do this because you are not going to do that. And I

would be interested, frankly, if you two could kind of argue your way through this, to enlighten us.

Mr. MCMINN. We are doing it. We are deploying wherever it makes economic sense. And we are going to continue to push out farther and farther as the prices come down. We are not a cream-skimmer. I offer service to over a million people in the Bay area, everywhere from Santa Rosa, which is 2 hours north of San Francisco, to Morgan Hill, which is an hour south of Silicon Valley, and every home in between and every central office that I can get into.

Mr. ZELL. I just wanted to clarify that for U S West, in our territory, our interconnect terms and conditions allow for the use of what is called a spot bay approach. We do not require that somebody build a $100,000 cage. We allow them to put in one rack at a time.

Senator ROCKEFELLER. I am sorry, racks, to me, are something they eat in Louisiana. [Laughter.]

Mr. ZELL. I am sorry. The reference was that we were keeping them out of the marketplace because of this $100,000 fixed cost to build a big cage to put all their equipment in. And what I am saying is, in our territory—let me speak for U S West—our interconnect agreements do allow for people to just put in one shelf at a time in our central offices, without a cage. So we have not created that kind of a barrier.

Mr. MCMINN. Which is something that we spent 9 months and forced them to do, as the first CLEC in the United States. And we still have not gotten a cage up and running or gotten a collocation facility up and running.

Senator ROCKEFELLER. And how was it—when you say that you forced them to do that, can you elaborate?

Mr. MCMINN. We were in arbitration, and we requested their documentation on the technical feasibility of cageless collocation. And when faced with an order from the PUC to deliver that, they decided to offer us cageless collocation.

Senator ROCKEFELLER. As always in America, litigation triumphs. [Laughter.]

Mr. MCMINN. Right. I wish it was not with the lawyers. I wish it was on a business case basis.

Senator ROCKEFELLER. Yes.

Do you want to say something, Mr. Zell? My time is up.

Mr. ZELL. No.

Senator BURNS. Senator Wyden.

Senator WYDEN. Thank you very much, Mr. Chairman.

You know, you listen to this debate, and I am sure people say initially it sounds like a lot of techno-babble. But at the end of the day, for me the question is, as Senator Rockefeller has touched on, is whether folks in rural Burns, OR, are going to have access to the same kind of technology as people in Boston. And I want to see if I can just kind of take you briefly through what I see as the respective arguments of the disputants and then possibly a scenario that could move us ahead.

Now, the Bells have asserted to all of us on the subcommittee that the Act allows them to offer data long distance at this point. And then we have got folks on the long distance side and the Internet providers arguing that the Bells simply want to hold on to their

local market monopoly while building the systems that are needed to offer long distance. And the long distance folks and the ISP's go on to say that if the Bells build this system for data, they will have it to begin offering long distance voice and then say, in effect: Gee, we cannot tell whether it is data or voice going over the long distance lines, so we are *de facto* offering long distance.

And I guess my question for the three of you would be, if Congress gives the nod to the Bells to do this—gives the FCC the nod to allow the Bells to do this—and I am inclined to support that kind of policy, how do you create a situation so that there is an assurance for rural Americans that they are actually going to get these advanced telecommunications services?

For example, you know, Mr. Zell, if you had come to the subcommittee today and said, Look, if we are allowed to do this, we will agree to a specific timetable, we will assure Senator Rockefeller and all of those—Senator Dorgan and others, who have been part of this effort to advocate for rural Americans, that on a date certain we will make sure that 80 percent of these advanced telecommunications services are available. That is the kind of thing that would strike me as a reasonable approach as we try to come up with a balanced kind of effort.

But it seems to me, absent that, we are just going to continue with this argument between yourselves and particularly the long distance folks and the people who are trying to offer competitive services at the local level, who I think are sort of in the middle, trying to figure out the sensible policy, as well. But why don't we start with you, Mr. Zell. And understand that I am sympathetic to what you are trying to do. But I want some assurance that when you get to do this that there is going to be a timetable, a concrete, specific timetable for folks in rural communities to get the fruits of this technological revolution.

Mr. ZELL. Thank you.

Let me first address the issue about, gosh, isn't this just another way for us to get into the long distance market and gee, we will never know they were talking over that line. Here is where we stand on it. We are in no way interested in pursuing this for the support of voice traffic. In fact, if anything, we are trying to get data traffic off of the voice network. We are willing to go as far as making the commitment that we will not sell or market these services for telephone-to-telephone types of long distance capabilities. So that is not why we are doing it.

This is really to support high-speed Internet access, data and other multimedia applications. And we have no—we are not interested and are willing to commit that we are not going to go out and market IP telephony services for voice-to-voice calling that simply is another form of long distance, because that would be—that is not the way that we are going after it. We have filed 271 applications in Montana. We plan to file in many other States. We are going about it through the normal process.

I think that, relative to commitment, I can tell you that I personally struggled with this one a lot. I knew that if I could show up and say, You give me this and I will give you X, that would have made it a lot easier. The problem is I do not know how far to think that you might go. Right now, what I have been able to do is figure

out how to get service to about 236 central offices at about $40 a month for 256 kilobit per second, plus about $20 a month for Internet access. So, for $59.95 a month. I think I can probably drive that down into the $45 total price range.

For me to be able to keep it affordable, in that price range, I am not sure how much further I can go until I am able to run the economics, understand it. But I think it is entirely reasonable to say that there should be some specific timetable and commitment against this. And I do not think that is outside the realm of reasonable.

Today we have committed we are going into 236 central offices, barring some regulatory stuff that is going on in a couple of our States. We think that we will have that done in about 2 months. So, from my standpoint, I am not prepared today to give you that commitment. However, I am not unwilling and would be willing to work on that and bring that back if that would make a material difference in that relief.

Senator WYDEN. Mr. McMinn.

Mr. MCMINN. Thank you, Senator Wyden.

I guess my belief is that they may very well make a commitment. They will make a commitment to a new monopoly that follows on after the old monopoly. The commitment we need is that they will open up their plant to competition in a fair way. And then the industry as a whole will drive the benefits of high-speed broadband connectivity well out into the rural areas, and with systems like the Universal Service Fund, into all rural communities.

I do not think it is a question of having to get a commitment from the ILEC's to do this because no one else will. We will do that. We just need the economics and the cooperation of the RBOC's to go away and do it.

Senator WYDEN. Sir?

Mr. KERKESLAGER. Yes, if I could, several points, Senator Wyden. The U S West representative just contradicted his CEO flatly, in which he is directly quoted as: "That is why we are aggressively deploying a robust nationwide network that can carry packet switch data as well as voice calls."

So, putting that aside, the issue we are talking about is not an enhanced service, not an information service, per se. The deployment of xDSL technology should be thought of as taking the local loop and creating a private line-like capability from the customer's premises to the central office—a high-capacity, very basic telecommunications service. What rides upon that pipe is, typically, Internet service, voice telephony, things like that. They can all be intermixed.

So what we are talking about here is nothing more than that. It is a basic telecommunications service, covered by sections 251 and 271.

U S West also is literally giving the sleeves out of its vest, because from the 236 CO's out of 1,232 CO's, it is clear that U S West is not yet serving the rural areas of Montana. And it is also clear that the only way it will happen is if you truly open up the local office and let people go in there and innovate on how to serve the rural areas.

Senator Wyden, I am working with Klamath Falls, and have been working with Klamath Falls for over a year, to help try, in a practical way, to solve these rural issues. I think there are lots of ways this can happen. It is not by creating an extended monopoly and trying to get a promise from a company that has practiced their devotion to rural areas by selling off their rural areas, as their policy.

Senator WYDEN. My time is up, Mr. Chairman. I am going to be in Klamath Falls on Friday. So I know that you and others are working over there.

I will tell you that this raises certainly more questions than it answers. Mr. Zell, I think you are clearly saying that you all are willing to show some evidence of tangible performance, in terms of rural areas. As I listened, we had a question about Internet telephony, and that was essentially what the AT&T folks were talking about. We have also received a substantial amount of input about how difficult it may be to distinguish between data and long distance calls over the Net.

So these are the kinds of questions that have to be answered. But my colleagues have spent a lot more time on these rural issues than I have on this subcommittee and are asking all the right questions. And it seems to me that unless we have something that is both pro-competitive, which would avoid the sort of new monopolies that several of you have touched on, plus evidence of real performance in rural areas, we are not going to be able to make much progress. And I would encourage you all to have some discussions among yourselves.

And I thank you for the time, Mr. Chairman.

Senator BURNS. Thank you, Senator Wyden.

Give me an idea—and then we are going to go to the next panel, and we may have more questions from Senator Rockefeller in which case we will certainly have a second round—the difference between DSL and ADSL and are they compatible?

Mr. KERKESLAGER. Mr. Chairman, the letters and the acronyms in front of the DSL simply talk about the configuration of how much information you are sending upstream from the premises, up to the network, and how much is coming down, whether those speeds are fixed in time or whether they can vary over time. But you have ADSL, you have HDSL, you have—that is why we put the "x" in front and say, let us just talk about digital subscriber loop. And you can configure that bandwidth in different ways. They are all compatible.

Senator BURNS. Well, you are talking about something I know a lot about when you put the "x" there. That is unknown. [Laughter.]

Now, can you answer me this. If you had total access, collocation of equipment, at a reasonable cost—and I think it was you, Mr. Kerkeslager, that said that you are still in the negotiating stage on what our monthly cost is going to be or lease of their infrastructure, Mr. Zell's infrastructure in this case—and access, if we had all of that, folks that are in the long distance business, such as AT&T, is there enough inventory of broadband to handle all the demands for data services at this time?

Mr. KERKESLAGER. Yes, Mr. Chairman, there is. We are, as I said in my opening comments, going at breakneck speed, both AT&T

and the other long distance carriers, and the new entrants like Qwest and so forth. We are moving toward 150 terabits of capacity on the books, in terms of what this industry is planning to put out there.

We are putting in new fiber, a lot of carriers are putting in new fiber, at the same time our vendors are inventing ways, through wave division multiplexing, to take a given fiber and increase its capacity by a factor of 2, 4, 8, 10, up to 80 times, so that you can continue moving up in capacity without even installing any new fiber. Just change the terminals at the end of the fiber and you can get up—at the present we are going like 100 gigabits per second, 100 billion bits per second as the latest technology.

Senator BURNS. What I was going for there is that I am trying to find out where we are deficient in bandwidth.

Mr. KERKESLAGER. Very quickly, it is really in the local loop. And I will let you expand upon that.

Mr. MCMINN. It is really in the local loop. If you look over the last 10 years, the performance of microprocessors has increased by a factor of 80. The performance of modems has increased by a factor of six. It is not the highway, it is the on- and offramps. It is the local loop. It does not have anything to do with the lines that interconnect metropolitan areas or even small towns. It is the lines that go out from the central offices into the individual homes and small businesses that have been the bottleneck.

Senator BURNS. Mr. Zell.

Mr. ZELL. From my standpoint, clearly the breakthrough in technology is this rate adaptive DSL technology that now allows us to take that local loop, which has been very much limited to 28.8 or 56 or some other low-speed dial up capability, and now allows us to run at 20 to 200 times what we have historically.

I just want to reiterate, from my standpoint, the fact that there are 11 different companies building nationwide fiber backbones in terabytes and gigabytes and whatever bytes worth of capacity does not matter. The information superhighway does not pass those towns and villages. It just simply does not get there. That is where my biggest cost element is.

I understand, for these other providers, they are coming at it from a different perspective. They need to get access to the local loop. We do not contend that a bit. The point I am trying to make is it really is an issue for me. The only way that I can serve rural America, to his point, is for me to figure out how to drive down the cost of backhaul, getting it to the highway, the side street to the highway, that today I have to build, pave and pay for, and how I get that backbone down and how I get those handoff costs down, because that is the big thing that is keeping me from doing further deployment of this service at a reasonable price.

So I guess I would respectfully submit that we have different perspectives on this. In my case, I am running a business. I have deployed this technology. I would like to deploy it further. And I am just telling you, point blank, my problem is the backbone, the backhaul is too expensive. It does not reach smaller towns and rural areas. And if I could build an Internet backbone within my territory that would allow me to mix multiple kinds of data traffic, share the economies of that investment, I could substantially drive

down that underlying cost, and I would fully intend to pass that along as an underlying rationale for the further deployment at a reasonable price of this service.

Senator BURNS. Generally, have your State PUC's been involved in negotiations of costs?

Mr. ZELL. Relative to the deployment of DSL?

Senator BURNS. Yes.

Mr. ZELL. I would say that in probably 8 or 9 out of the 14, they have been so excited to see us bring it to market that there really has not been a lot of discussion or debate over it. In a few of our States, we are having substantial interaction from Internet service providers that believe that the big bad wolf is coming or something, with us bringing this service out. And so we are getting a lot of help scripting our sales channels and other things like that, that are slowing our regulatory approval.

Senator BURNS. Now, tell me, and maybe all three of you could comment on this, how about a negotiation of the cost of access and using RBOCs' infrastructure, have they been involved in any of those negotiations, or has that strictly been between commercial entities?

Mr. KERKESLAGER. Mr. Chairman, you are talking about the State public utilities commissions?

Senator BURNS. Yes.

Mr. KERKESLAGER. In general, as a flat statement, the regulators get involved when we have been negotiating and have come to an impasse, and we have to go to them to try to resolve issues of lack of space, costs that are too high, things like that.

Senator BURNS. Anybody else?

Mr. MCMINN. I would just say that that is absolutely the case. They get involved sort of after the fact, after there is an impasse. And in many States there are not final costs that have been determined, especially for the more innovative capabilities, like the use of a copper loop for DSL. That is why we have these widely varying costs, from $46 in Texas to $3 in Chicago, for the same physical piece of copper, because no one was really focused on these advanced uses. There is a time lag involved here.

Senator BURNS. Well, I would say the difference between Texas and Chicago is kind of like two fellows in Montana buying watermelons in Mississippi—buying them for 75 cents a piece and trucking them to Montana and selling them for 74 cents a piece. He says, Harley, we ain't making no money. He says, I know, we've got to get a bigger truck. [Laughter.]

The volume may be here.

Senator Rockefeller, do you have any further questions of this panel?

Senator ROCKEFELLER. None to match that level of wit. [Laughter.]

Senator BURNS. You will think of something.

Senator ROCKEFELLER. But I will think of something.

Actually, I have about three real quick ones I would like to ask. One would appear to be irrelevant, but it is just something which I am very curious about. You are talking about voice traffic. And my question, basically, is this. Could each of you just give me a one-number guess. In 15–20 years from now, what percentage of

voice communication between people in this country and worldwide will be on telephones as opposed to on the Internet or other advanced technologies?

Mr. ZELL. From my standpoint, the answer is probably 80 percent. But, really, the Internet, the IP protocol is just another protocol. It is going to evolve to support all traffic types and forms. So, over time, that is clearly going to happen.

And I just want to clarify, around my comment, that we were willing to commit not to sell or market, you have to take steps generally to build a transparent voice over the Internet kind of service. If you want to make it so that somebody does not have to dial a billion digits and kind of go back to 1983, with 21-digit dialing plans, you have got to integrate. And what we are saying is that we will not take those steps until such time as we have got appropriate relief given. But it is the bulk probably.

Senator ROCKEFELLER. Mr. McMinn.

Mr. MCMINN. Today I think Chairman Burns said the balance is about equivalent, data traffic and voice traffic. In 10 years, data traffic will be at least 10 times larger than voice traffic, and in the process will create an economy that will allow voice to be handled on a data network much more cheaply. So 80 to 90 percent of voice, but it will still be a small fraction of the overall data traffic.

Senator ROCKEFELLER. You would agree, sir?

Mr. KERKESLAGER. I agree with those percentages. I believe the specific sub-question you asked about voice and the overall balance depends very much on the subsidies that are paid. At present, the voice traffic is paying—at least the interexchange carriers—are paying access charges, with all of the subsidies within them. The Internet, at the present time, any voice traffic that flows over that is not paying anything, in terms of Universal Service support.

Senator ROCKEFELLER. Right. And you lead me right into the reason I asked that question. And that gets back to the FCC, sort of the blurring between telecommunications and information. And it would seem to me that they kind of went out of their way to blur. Thus, meaning that some ISPs, yes, some no.

The whole point of the Telecommunications Act obviously was to advance the technology and increase competition. But the real purpose of the Telecommunications Act, as I understood it, was to make sure that there is no two-tiered society, whether it is schools and libraries, whether it is the advanced technology that we are talking about here, that everybody gets a fair shot. You do not travel north-south, from Pennsylvania, which is a big State, and those are four-lane interstates, then you get to West Virginia, which is a smaller State, and then you go to two-lane, and then you get to Virginia, which is bigger, so you go back to four-lane.

In other words, West Virginia supports the Coast Guard. We have relatively little use for the Coast Guard in West Virginia, but we support it with our tax dollars. I mean Universal Service is the whole point of everything that we are talking about. And with that in mind, therefore, how do you three gentlemen think we are going to make sure that as we approach this, through ISP's and other ways, to make sure that everybody is paying their fair share into the Universal Service Fund, which is the Telecommunications Act?

Mr. KERKESLAGER. Mr. Senator, the key issue—I work as a volunteer in our local schools and our local library, we are always trying to get enough money to provide the services we need. I appreciate your question on many levels. The issue I think is identifying services, not capacity of pipes. The telecommunications services we are talking about here pay into the Universal Service Fund. Enhanced services, information services, such as Internet traffic, that is, IP-based, traditional Internet data, is not paying and I feel should not pay.

It is possible to have those streams flowing over the same pipe. Whether it is an IP-based pipe or whether it is an ADSL, HDSL, any kind of high-capacity pipe in the local loop, the basic pipe is basic telecommunications service. What flows within it can be both basic telecommunications service, such as voice, or it can be Internet data traffic, which is an enhanced information service.

Senator ROCKEFELLER. Or Internet voice traffic communication.

Mr. KERKESLAGER. Exactly the point. If it is Internet voice, you should be able to see it, measure it, and have it contribute to the Universal Service Fund.

Senator ROCKEFELLER. I love the ending of that, but it did not square with me what you said in the middle. And that is I do not think that everybody in ISP ought to have to contribute.

Mr. KERKESLAGER. An ISP is called an ISP because it is an Internet service provider. The Internet started as an information data flow and was declared to be a non-contributor to the Universal Service Fund. And we are comfortable with that and we support that.

When the Internet service providers and the networks begin to provide basic telecommunications service, that capability and that capacity, that portion of the service, should contribute to the Universal Service Fund.

Senator BURNS. Is the technology available so that that could be measured, whether it is data or voice?

Mr. KERKESLAGER. There should be mechanisms without a doubt. I do not have it right here in my lap, but if we spend a little bit of time talking about it, I am sure we can come up with it.

Mr. ZELL. From our perspective, let me interject today there are a couple of different ways Internet telephony happens, people talking over the Internet. One of the kinds of services that has been announced where today you dial a number of digits to reach an Internet service provider or long distance provider that is offering that service, in that case it is absolutely possible to count every second of that traffic and cause them to participate in that universal service funding.

To the extent that somebody hooks up a microphone to their PC and uses some kind of Internet telephony freeware program they got off the Net to talk to somebody in another place, I do not think that it is reasonable to set an expectation with you that it will be possible to track or measure and monitor that traffic.

Senator ROCKEFELLER. As I would say to you that I am not sure that the voice is necessary to defining something as "voice communication." I mean, in other words an E-mail via the Internet is as much a voice communication, so to speak, in my judgment as is the audio add-on that you refer to.

Mr. Chairman, just two quick questions, and I apologize. There was a very interesting shot, Mr. Zell, that was taken of you at the last round of questions, which I want to give you a chance to respond to, by Mr. Kerkeslager, whose name is as difficult to spell as is mine.

He said—I thought I heard him say that basically what you are trying to do is sell off rural services as fast—not as fast as possible, but something of that sort. It was not a generous statement. Let us put it that way.

Mr. ZELL. I was trying to decide which of the shots you meant. [Laughter.]

Senator ROCKEFELLER. And the reason that interested me is because you had just sort of made this very, very heartfelt commitment, if only we could get our hands on it, et cetera, this is what we want. We want to get it. We want to do all the rural areas. We want to do that. And you answered that to Senator Wyden, and I want to give each of you a chance to expand on that for a moment, because I think it is important.

Mr. ZELL. To his point, we clearly have sold off some rural exchanges. That has been a good economic decision for us. It has represented a rounding error in the number of lines that we serve and customers that we serve.

Not that those people are not important. I do not want you to read that into my comment, but we have sold off a very small number of our total exchanges, of the total lines that we serve, and in many cases that was actually better for the people in those communities because small rural operators, rural telcos, have access to much greater funding than we do from a universal rural electric cooperative and other facets, so in many cases now you will find that some of the best services available in those places where they have been sold off, they are now in the hands of a smaller operator because they get access, frankly, to a lot of subsidies that we do not have access to directly.

So it is true, it is a small part. I still have 10.5 million customers. Only about 60 percent of those lines, in my territory 60 percent of those customers are in nonurban areas that I still need to find a way to serve and that will not be served under my current deployment, so I do not want that comment to somehow minimize that I still have a problem here. I still have a big one.

Senator ROCKEFELLER. Did you want to reply to that, sir?

Mr. KERKESLAGER. Certainly. I do not look on rural areas as a rounding error to AT&T. AT&T has a 40-percent higher market share in rural area consumers than we do on a Nation-wide average, and so we serve more consumers, relatively speaking, in rural areas than we do in suburban and urban areas. I think the facts speak for themselves, and even as U S West talks about serving rural areas, they have chosen only 236 or 20 percent of their exchanges. You and I know where those other exchanges are. They are in the rural areas.

The other point is that U S West said it would be expensive to get the facilities to those rural exchanges so they can participate in the enhanced services. It seems to me that those rural exchanges are the very exchanges that U S West is obligated to serve and to have high capacity facilities in to get them from the rural

areas into the metropolitan switches so they can be served efficiently.

And if it is expensive to do that, I know a good place where they can get facilities that are less expensive, and that is from interexchange carriers who seem to have lower prices, and if the prices are higher, I would like to know why they are higher from U S West.

Mr. ZELL. I guess we could solve this whole problem, then, by just getting AT&T to commit to a new flat rate price for high speed Internet backbone bandwidth in any of the small towns I want to go to, and the same for you. That would solve the problem. I just do not think we are going there.

Senator ROCKEFELLER. Mr. Chairman, I have no more questions.

Senator BURNS. You started this fight. Now you have to end it. [Laughter.]

Senator ROCKEFELLER. I am going to, because it strikes me there is a very interesting parallel on this thing called the Medicare Commission. In other words, telecommunications and health care appear to have a lot in common.

If you let the market work in health care, what you will see is what is happening in Chicago and many other areas and what is happening also in rural areas, and that is, hospitals have to close down their emergency rooms because that is the only thing that is market-driven in a health economy because it is the most expensive part of the hospital. It also means if you are in trauma and have some catastrophic problem that is the only place you can go, and that has to be available 24 hours a day.

So that is an area where the Government, in a sense, has to come in and say yes, you cannot do this, or we are not going to allow that, or something. Health care people do not necessarily like that.

It also therefore strikes me as the incredible importance of the Federal Communications Commission, this argument that we have heard, plus this panel, the incredible importance of the Federal Communications Commission.

I think the Federal Communications Commission is simply the most exciting Government service that one can do today, to be one of those commissioners, with the types of decisions they have to make, and they are going to—you know, you cannot all argue it out. Some of it is going to be in the courts. Some of it is also going to have to come from wise leadership at the FCC.

I think this argument really enhances the requirement for strong, aggressive, bold FCC participation in a way which, as I say, is wise and fair, as much as possible, to all concerned.

Thank you, Mr. Chairman.

Senator BURNS. Thank you, and we thank the panelists today, and I would imagine there will be more questions. If you will make yourself available for written questions and can respond both to the committee and the individual Senators I would appreciate that very much. We will leave the record open.

Because I, like Senator Rockefeller, think this is probably the heart and soul of what was a moving force of the Telcom Act because of the services that we find that are very important, and they

are really needed in the rural areas if we are to be a part of this great nation.

So I thank you for coming today, and we will call our second panel, which is Mr. Russ Daggatt, president of Teledesic Corporation out of Kirkland, WA, Jeffery Eisenach, president of The Progress & Freedom Foundation; David Finkelstein, senior vice president, marketing and business development from Washington, DC.; Erik Olbeter, Advanced Telecom; and Timothy Regan, who is vice president of Corning Incorporated.

If we can get settled down now, I understand we are running up a little close to the wire on a couple of you, and I will call at this time Mr. Timothy Regan, who is with Corning Incorporated. Thank you for coming today.

STATEMENT OF TIMOTHY REGAN, VICE PRESIDENT & DIRECTOR, FEDERAL AFFAIRS, CORNING INCORPORATED

Mr. REGAN. Thank you, Mr. Chairman. I am delighted to be here. It is a great opportunity. You know, the Good Lord did not—he did. It took him 7 days to create the Earth as we know it today, and that is in Genesis.

Senator BURNS. Only 6. He rested on 7.

Mr. REGAN. OK. Well, it took him 6 days, but you know, the word in the telecommunications world is that he did not have an embedded base, and that is the problem we have got here. There is an embedded base out there, and it is made of copper wire, and it is very, very weak in terms of its capability, and the issue before us is when and if that is going to be enhanced so that you can provide higher speed capability.

Now, I am here to tell you that from our little piece of the world, which is the manufacture of fiber optics, it is not happening like we had expected we were going to see it happen, and let me give you some examples.

Whenever there has been a major change in the past 20 years, a big surge in competition, the incumbents have responded by making strategic investments. When AT&T was broken up, the interexchange market exploded in terms of fiber optics, increased by 82 percent.

When the Cable Act was adopted and the stranglehold over programming was broken and the DBS guys got in the business, the cable guys responded with an explosion of 143 percent increase in the deployment of high speed capability.

But when the Cable Act, when the Telecom Act passed the ILECS, the incumbent local exchange carriers did not respond, not as they had expected they would, given the history. In fact, what happened is investment in optical fiber declined by 6.4 percent.

Now, that followed a 12-year run of annual increases of 35 percent by the ILEC community, so I know we cannot judge the Telecommunications Act by what happened in the fiber optics industry. I am not certainly suggesting that. But I am suggesting some of the expectations have not been fulfilled, so I think we do have an investment problem.

Now, I think there are also some other evidence out there perhaps presented by others like Erik on the analysis he has done that shows that there is a problem on the investment side.

So why is there a problem, particularly with respect to the ILEC's? It is not technology. I show in my paper there are some 30 different architectural solutions for high speed data and local access, some including fiber, some satellite, some wireless, and I am not here to promote fiber optics. It is one of many, and we are confident that we will prevail once the market begins to work.

But there is something that happened. There is something that stalled. We are sort of stalled on the way to the home, if you will, and the reason why we seem to be stalled on the way to the home is part market, market uncertainty, but it is partly regulatory uncertainty.

Let us face it, the Telecommunications Act is tied up in litigation. You know, what the Supreme Court does in the end will determine whether investments are going to make money or not, and they are going to determine whether or not competitors are going to be able to evolve quicker than they are, so it is understandable that we are sort of kind of stuck.

Now, you expected this, Mr. Chairman. In fact, you anticipated this. You were very prescient in your sponsorship of section 706, and I remember that Senator Rockefeller was also out there promoting that provision as well during the debate, because I think both of you saw that, you know, we could have a situation where you have a party and nobody comes, and I think that from a certain perspective you can say that that is what we had.

We have not had the kind of delivery of high speed capability that we had expected. Now, it does not mean it is not going to happen. It just means 2 years out from the passage of the Act the biggest player in the game has not yet decided how they are going to play, and I think that is a problem, and I think it is something that we ought to focus on.

Now, I think there is a solution, and I think section 706 provides the basis for a solution, but I think one thing demonstrated by the earlier panel is it is only going to happen if there is a degree of cooperation among the parties, and I think it can happen, and I think it can happen in a way in which it is not going to sacrifice any of the essential interests of the carriers, nor is it going to sacrifice the public interest. In fact, the public interest can be served by it.

Now, I have been bold enough to lay out some ideas in my paper, and I am probably going to get crucified for doing it, but I tried to do it. I tried to sit back and say, what kind of a system could we set up if we said there is a thing called section 706 data capability, and we cordoned it off, and we treat it differently than we treat other things.

Now, I know everyone says a bit is a bit is a bit in the digital world, but the fact is, in the world of telecommunications law and regulations a voice bit provided by an ILEC is treated different than a voice bit provided by CLEC, is different than a voice bit provided by cellular via PCS. Video bits are treated differently if they are provided by terrestrial broadcast or by cable TV.

The fact is, a bit is not a bit, is not a bit, is not a bit, and so we recognize that reality and we decide there is a thing called section 706 data capability, and we create a new paradigm, and in

that paradigm we guide the development of this thing by a series of principles.

1. Users make the choice. The user decides who is going to provide them delivery of the service.

2. Price deregulation at the user level. Let us deregulate the price. Let the market determine what the user pays.

Reduced regulation for all carriers. All classes of carriers get to play, including cable TV, which are not here today, but they are a very, very important player, and perhaps we ought to do some things to help them accelerate the deployment of high speed section 706 data capability.

Reasonable return on investments. You cannot expect anybody to make an investment in this capability and not let them make some money on it. It is just not going to happen.

3. Ease of entry. Where someone has a stranglehold, they ought to have to open it up, or the common carrier has a stranglehold over access to the customer, then they have to open it up, simple fact of life.

4. Reduction of barriers that impede inefficiency. We have just got to wipe them out. We have got to go ahead and deal with some of these problems where you have regulatory barriers that make people do things which do not make economic sense.

And finally, perhaps phased implementation. Maybe what we need to do is set this thing aside for say, perhaps 10 percent of the incumbent subscribers and experiment a little bit, let this thing roll out, do 10 percent now, roll it over to 20 or 30 percent later on, after 2 years, after you see how it works, but we have got to get started. We have got to get started because I think our national interests are going to be served if we get this thing moving sooner than later.

And Senator Rockefeller, I know how you follow Japan very closely. Japan is moving very, very rapidly in this right now. We have developed 1,000 fiber cable for the Japanese, and they are deploying fiber to every single home in the country, and they are not talking about 1 megabit. They are talking about 10 megabits bidirectionally in every home, and they intend to increase it to 10 gigabits sometime in the next decade, and it is going to happen with every single subscriber in Japan by the year 2010.

Senator ROCKEFELLER. When I read the comment—excuse me, Mr. Chairman. When I read the comments of Prime Minister Hashimoto on that subject a chill went from my neck down, because when they decide they are going to do something like that, they do it.

Mr. REGAN. And so I guess I am pleading, let us just get the party started.

[The prepared statement of Mr. Regan follows:]

PREPARED STATEMENT OF TIMOTHY REGAN, VICE PRESIDENT & DIRECTOR, FEDERAL AFFAIRS, CORNING INCORPORATED

INTRODUCTION

Mr. Chairman, I appreciate the opportunity to appear before your Committee to discuss Section 706. I plan to make three points in my testimony:

- There is an investment problem in America with the respect to deployment of high-speed, interactive, broadband capability, especially in the local access portion of the network.

- Section 706 was specifically designed to deal with this problem.
- A solution to this problem can be developed that will not sacrifice the essential interests of any of the competing carriers or the public interest, but rather will create a more conducive climate for the rapid deployment of high-speed broadband capability to all Americans.

I should also say that I am not here today to promote fiber optic technology as the sole solution to the investment problem. It is not.

There are a multitude of different technologies and architectures that can be deployed to provide high-speed, interactive, broadband capability in the local access portion of the network. These solutions can be fiber-based, copper-based, wireless, or some combination of all of these.

There is simply no one technology or architecture solution to fit all circumstances. The carrier should determine what technology to deploy based upon expected service demand, cost, typology, and other factors.

While regulation does play a role in the carrier's investment decision, this role should be reduced to the level necessary only to ensure that competitive markets prevail.

THE INVESTMENT PROBLEM

A strange thing happened on the road to implementing the Telecom Act—investment in high-speed, interactive broadband capability by incumbent local exchange carriers ("ILECs") dropped. What is stunning is that this decline followed a dramatic twelve year run in which investment by ILECs in such capability grew by an average annual compound rate of 35%!

Let me be more specific. In 1996, the first year of the Telecom Act, ILEC investment in optical fiber declined by 6.4%. This decline was extremely sharp in light of the fact that ILEC average deployment grew by 35% annually from 1983 to 1995.

What is more interesting is to compare this rather negative experience following the passage of the Telecom Act with the very different positive experiences after the divestiture of AT&T and the enactment of the Cable Act. With both AT&T divestiture and Cable Act enactment, the incumbent carriers responded to the new conditions of enhanced competition by rapidly investing in fiber optics to gain strategic advantage. Let me explain my point with a little history.

Fiber optic technology was invented by Corning Incorporated in 1970. During the decade of the 1970's, the technology pretty much remained "on the shelf." AT&T was a vertically integrated monopoly at the time and had little interest in the deployment of new fiber optic technology. Frankly, AT&T was acting quite rationally at the time. Why would it invest in new technology which would merely obsolete its embedded base of copper and microwave facilities? It owned the market.

But the divestiture of AT&T introduced a whole new dynamic into the market. MCI, Sprint, and other new competitors were given a chance to compete against AT&T in long distance service. This new competition drove the deployment of fiber optic technology. In 1985, the first year of the divestiture, deployment of optical fiber in the long distance portion of the network increased by 82%.

More importantly, the incumbent, AT&T, changed its strategy. In the mid-1980's, it took a multibillion dollar write down on its copper and microwave facilities to advance the deployment of fiber optics. The market worked.[1]

The passage of the Cable Act in 1992 witnessed a similar experience. The Cable Act introduced a whole new level of competition in the delivery of entertainment video by breaking the stranglehold that vertically integrated cable operators had over programming. Section 628 of the new Act essentially required that vertically integrated cable operators make their programming available to competitors, primarily DBS providers, on reasonable terms and conditions.[2] This made DBS providers a serious competitive threat to the incumbent cable industry.

The result of this new reality, as well as other factors like the threat of Video Dialtone, gave incumbent operators the incentive to deploy a wholly new architecture known as hybrid fiber coax.

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[1] See Chapter 9 (pp. 264–299) of *The Silent War: Inside the Global Business Battles Shaping America's Future* by Ira Magaziner and Mark Patinkin for a full description of the history.

[2] Section 628 (b) [47 U.S.C. 548] states:

"It shall be unlawful for a cable operator, a satellite cable programming vendor in which a cable operator has an attributable interest, or a satellite broadcast programming vendor to engage in unfair methods of competition or unfair or deceptive acts or practices, the purpose or effect of which is to hinder significantly or to prevent any multi-channel video programming distributor from providing satellite cable programming or satellite broadcast programming to subscribers or consumers."

This new architecture, which made significant use of optical fiber, gave incumbent cable operators a way to compete effectively against DBS providers. With this new fiber-based architecture, incumbent cable operators could substantially increase channel capacity, improve their picture quality, enhance their reliability, and position themselves to provide new services like high-speed data and telephony in the future.

As a result, deployment of fiber optics by the CATV industry increased by a whopping 149% in 1993, the first year of the Cable Act implementation.

Compare these two previous experiences with the recent Telecom Act experience. Divestiture saw an 82% increase in fiber investment by the incumbent industry. The Cable Act saw a 149% increase in fiber investment by the incumbent. But, the Telecom Act saw 6.4% decrease in fiber investment by the ILECs. Clearly, something went awry.

Fortunately, the other segments of the fiber optics market, including the competitive local exchange carriers ("CLECs"), the inter-exchange carriers ("IXCs"), the CATV industry, and the utilities showed strong growth after passage of the Act. This compensated to some degree for the decline in the ILEC sector. Certainly, this growth is attributable in a positive way to the Telecom Act passage, particularly with respect to IXCs, CLECs, and the utilities. But these sectors remain relatively small compared to the ILECs.[3]

Admittedly, these data are limited to the experience of the fiber optics industry. And certainly, the success of the Telecom Act should not be determined by the fate of the fiber optics industry. But, these data provide a strong indicator that the rapid deployment of high-speed, advanced, broadband capability, by both incumbents and new entrants, expected from the Act's passage hasn't occurred. Two years after enactment, the incumbents haven't made their move.

This conclusion is supported by analysis of ILEC investment published recently by the Economic Strategy Institute ("ESI"). At a March 3 conference on broadband infrastructure, ESI released an analysis which concluded that:

> "Total [ILEC] investment in maintenance and modernization has been negative."[4]

Certainly, this conclusion could not be drawn if the ILECs were rapidly deploying high-speed, broadband capability.[5] Policy makers should be concerned about the reluctance of the ILECs to invest in high-speed, broadband capability because they are such a huge investor in our nation's telecom infrastructure. They are the biggest investor, at about $20 billion annually.

This doesn't mean they should be given preferential regulatory treatment, but it does mean that the future of our infrastructure will be determined in large part by how much they decide to invest, how fast they decide to deploy new infrastructure, and in what technology they decide to deploy. We ignore them at our own peril.

REASON FOR INVESTMENT PROBLEM

So why does there seem to be a reluctance on the part of ILECs to expand rapidly their investment in high-speed broadband capability? Frankly, I think the answer is very complicated. It is slightly different for each carrier. But, one thing is clear, this reluctance is not due to the unavailability of technology solutions.

The ILECs face a multitude of choices in deciding which technology to deploy to provide high-speed, broadband local access. Within the three basic technology choices: fiber-based, copper-based and wireless, there are at least thirty different architectures. I have included in my testimony a paper (Attachment 1) authored by Paul Shumate from Bellcore which highlights all the different technology and architectural choices for high-speed, broadband local access. It is truly an alphabet soup ranging from ADSL to HFC to FTTH.

Corning believes that none of these technologies or architectures will prove to be dominant. Rather, carriers will use whatever combination of technologies and architectures to most efficiently meet their needs.

The point is, the range of technology and architectural choices provides ILECs with many alternatives. Responding to market forces, they should be able to select whichever mix of cost and performance they believe best meets their customers' needs.

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[3] The CATV sector is also very large. In 1997, the CATV industry deployed more optical fiber than any other sector including the ILEC's.

[4] See *Is America Investing in Communications Networks?* by Erik R. Olbeter, presented at ESI Conference, America's Broadband Future, March 3, 1998.

[5] ESI also concludes that the definitive investment behavior of the ILECs is difficult to establish from the public data that is available.

If the absence of technology doesn't explain the reluctance of the ILECs to invest in high-speed, interactive, broadband capability, what does? We think the answer is a combination of market uncertainty and regulatory uncertainty.

There are two principal forms of market uncertainty that the ILECs face. First, there is an uncertainty over what types of high-speed broadband services subscribers will purchase and at what price. ILECs know that subscribers will buy one-way entertainment video (i.e., CATV service) and 2-way voice (i.e., local telephony). But, will customers demand full interactive broadband capability so they can do video conferencing, video telephony, or switched video entertainment? Or, will they be satisfied with a lesser level of service but one which is improved over that which is available today—perhaps higher-speed data?

It is important to note that this type of market uncertainty over consumer demand faces all carriers. It is not unique to ILECs.

Second, ILECs face uncertainty about their competitive threat. As noted earlier, competition drove AT&T in the 1980s and incumbent CATV operators in the 1990's to invest in broadband fiber optic capability. But as you know, competition especially in the residential telephone market, has been evolving more slowly than policymakers probably thought it would when they crafted the Telecom Act. Without competition, incumbents do not face a strategic imperative to act.

Finally, ILECs face a regulatory uncertainty. The implementation of the Telecom Act is now caught in the web of litigation. The Supreme Court will ultimately have to render a judgment on the constitutionality of some of the basic elements of the Act. The outcome of these decisions will affect significantly the prospect for earning a return on new investment by the ILECs.

This regulatory uncertainty also affects potential ILEC competitors for local service. They too are uncertain about the rules that will govern market behavior.

Obviously, government can't do anything about the market uncertainties. But, it can do something about the regulatory uncertainty. Section 706 was designed to give the government authority to act.

There is an interesting similarity between the uncertainty in the telecom market over the Act's implementation and the uncertainty in financial markets due to the budget crisis. During the period when the budget seemed to be out of control, real interest rates in the United States were substantially higher than those in the rest of the world.

But now, with the government having removed the uncertainty associated with the budget deficit by agreeing on the Balanced Budget Act, interest rates have dropped dramatically. This has created greater certainty in the financial markets and no doubt has contributed significantly to the records on Wall Street.

Perhaps, by government taking action to create certainty in telecom regulation, we can have a similar effect in the telecom market.

SECTION 706—THE CLEAN-UP AUTHORITY

Thanks to your insight, Mr. Chairman, the Congress had the wisdom to enact Section 706. As you know better than anyone, this provision was specifically enacted to give the FCC authority to remove barriers and adopt pro-competitive measures to promote infrastructure investment should the Act fail to deliver on its promise. You foresaw that the Telecom Act was becoming so complicated and regulatory that it could in fact discourage, rather than encourage, infrastructure investment. Your concerns turned out to be prescient.

Let's go back to the principal objective of the Act itself. It states unambiguously that one of the Act's two objectives is to "encourage the rapid deployment of new telecommunications technologies."[6]

This broad objective in the Act was reinforced in Section 706 by directing the FCC and the state Public Utility Commissions to ". . . encourage the deployment on a reasonable and timely fashion of advanced telecommunications capability to all Americans . . ."[7]

The accelerated deployment of "advanced telecom capability" necessarily requires the investment by ILECs and other carriers in high-speed, interactive, broadband technology. The definition of such capability makes this clear. It states that:

> ". . . advanced telecommunications capability is defined, without regard to any transmission media or technology, as high-speed, switched, broadband telecom capability that enables users to originate and receive high-quality voice, data, graphics and video telecom using any technology."[8]

[6] P.L. No 104–104, 11 stat. 56 (1996).
[7] Section 706 (a).
[8] Section 706 (c)(1).

Although this definition is expressly technology neutral, the description of the capability as high-speed, broadband, two way, and capable of transmitting information in all of its forms bi-directionally makes "Section 706 capability" a substantial transmission capability, not limited service capability.

There is no question that Section 706 capability cannot be provided over the existing ILEC network. A telecom system is only as good as its weakest link. The copper wire that currently connects to 99% of businesses and homes in America is the ILEC system's weakest link. It is simply incapable of providing Section 706 capability without being enhanced electronically at considerable cost. This is a fact of life.

So it is very clear that to provide Section 706 capability new investment must be made. As indicated earlier, the technology and architectural choices are manifold. However, they all require a substantial investment.

This applies to all the options open to the ILECs. Even the much promoted ADSL—asynchronous subscriber digital loop, a compression technology that enhances the existing copper wire to provide a higher speed service—requires significant investment.

To make ADSL available to a subscriber, a data terminal and splitter must be installed by the ILEC in the switch and a modem on the customer's premise. We estimate that the cost of ADSL today is over $1000 per subscriber, including the cost of labor for installation. This assumes that the existing copper loop does not have to be reconditioned. If it does, the total cost of labor goes up substantially. The cost of the equipment will fall somewhat as increasing volumes are deployed.

It is also important to note that even if an investment is made in this new ADSL capability, such capability may not necessarily meet the definition provided for in Section 706. The supported data rate of the service is a function of loop length, condition of the copper loop, the number of subscribers using the service in the same " binder group," and the electronics currently installed on the loop.

Because of these uncertainties, ADSL may not necessarily meet the Section 706 definition. It may not be high-speed, broadband, or enable users to send information in all of its forms bi-directionally.

I have attached to my testimony (Attachment 2) an assessment of Section 706 capability compared to ADSL.[9] It provides a useful comparison.

ACTION NECESSARY

So it is clear that we have an investment problem and, fortunately, Congress has given the FCC the authority in Section 706 to address it. The question now is whether Section 706 can be implemented in a fashion so as to address the ILEC investment problem without violating the essential features of the Act, the interconnection provisions in Section 251, and the long distance service restriction in Section 271?

We think it can. But to do so will require cooperation among all of the carriers.

We believe that it is in everybody's interest to demonstrate that the industry can work together. Let's face it, there is a lot of doubt in Washington about whether the Act has worked. Section 706 may give us all an opportunity to demonstrate that it has.

Such a solution would isolate "Section 706 data capability" for different regulatory treatment than that provided for voice, video, or wireless service. The notion that all "bits" are the same in the digital world, doesn't apply to telecom law and regulation. The law treats ILEC-provided voice bits, CLEC-provided voice bits, wireless voice-bits, broadcast video bits, and CATV-provided bits differently.

This different treatment is due not to technology, but rather to economic reality. Regulation is only necessary in situations where competition is inhibited by the market power of a particular class of carrier. It has nothing to do with technology.

Fortunately, in the high-speed capability defined by Section 706 no carrier is dominant. No particular carrier has an edge. Any carrier who wants to provide this ca-

[9] ADSL is one variety of a family of xDSL capabilities. The various types of xDSL technologies vary by data rate and effective distance. ADSL provides 1.5 Mbps downstream and 16 kbps upstream at 18,000 feet, over a perfectly conditioned pair of copper wires. Under optimal conditions (inside 9,000 feet on high quality lines) and perfectly conditioned copper, this improves to 9 Mbps down and 640 kbps up. High data rate Digital Subscriber Line (HDSL) uses two lines and achieves rates of 1.544 Mbps, equivalent to a T1 trunk. Single line DSL (SDSL) is similar to HDSL but uses only one line. SDSL can achieve the same throughput as HDSL with half the lines, but at shorter distances—10,000 feet compared to 12,000 feet for HDSL. Very high data rate Digital Subscriber Line (VDSL) is used for the very short distances, and can achieve speeds of 13 Mbps under 4,000 feet and up to 52 Mbps at 1,000 feet. See generally ADSL Forum. General Introduction to Copper Access Technologies, http://www.adsl.com/general—tutorial.html. ADSL Forum, ADSL Tutorial, http://www.adsl.com/adsl—tutorial.html.

pability must make a substantial new investment. So the conditions of competition for Section 706 data capability are clearly different than those that exist for voice or video today.

Our proposal is to cordon off "Section 706 data capability" for different regulatory treatment. This regulatory treatment would be guided by the following principles:

- User Choice: subscribers to Section 706 data capability must be able to shift freely between providers like they do today with long distance service.
- User-Price De-regulation: the price for Section 706 data capability should be de-regulated with carriers free to charge subscribers whatever the market will bear.
- Reduced Regulation for All Carriers: all carrier classes should be able to provide Section 706 capability and propose the elimination of regulatory barriers that inhibits its deployment (e.g., the franchise fee that the CATV industry currently pay on the provision of high-speed cable service might be eliminated should they decide to offer a Section 706 data capability).
- Reasonable Return on New Investment: regulation which inhibits the ability of any class of carrier to earn a return on the investment necessary to provide Section 706 data capability should be amended to allow that class of carrier to earn a reasonable return.
- Ease of Entry: where a certain class of carrier has control over bottleneck common carrier facilities (e.g., ILEC control over the local loop), they should be required to make those facilities accessible to other carriers.
- Reduction of Barriers that Impede Efficiency: where a class of carriers can demonstrate that certain regulations impede their efficiency, these regulations should be modified to allow those carriers to gain efficiencies and maintain operational control over the delivery of Section 706 data capability.
- Phased Implementation: policymakers may be somewhat reluctant to pursue this new approach for fear that its consequences are unknown. If this is the case, phased implementation—perhaps allowing incumbent carriers initially to provide Section 706 data capability to 10% of its subscribers with phased expansion thereafter—should be pursued.

This new systemic approach is not designed to put any carrier at an advantage over another. Rather, it is intended to create a "Silicon Valley" experience for high-speed broadband deployment. It would enable the nation to build its strength, the ability of the private sector to compete and innovate with a minimal level of government intervention.

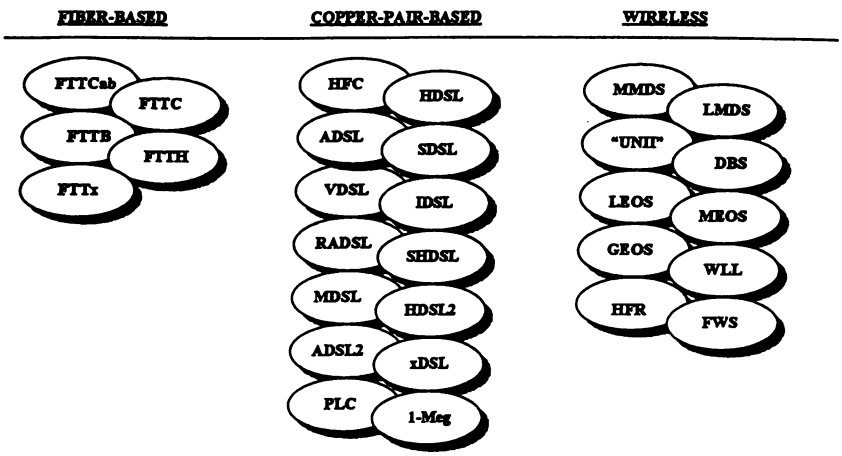
CONCLUSION

Hopefully, these ideas will be received by the Committee and the telecom community generally in the spirit in which they are offered—a goodwill effort to get the ball rolling. We remain confident that together we can find a solution to this problem and move forward while the litigation over the Telecom Act proceeds on its current course.

The goal here is not to create an advantage for anyone. Rather, its intended to create an opportunity for everyone.

ATTACHMENT 1

Competing High-Speed Local Access Technologies/Architectures



Definitions of Local Access Acronyms

Fiber	-FTTCAB	Fiber to the Cabinet
	-FTTC	Fiber to the Curb
	-FTTH/FTTB	Fiber to the Home/Building
	-FTTx	Fiber to the (fill in the blank)
	-SDV	Switched Digital Video (often FTTC + HFC overlay)
	-HFC	Hybrid Fiber/Coax
Copper	-ADSL	Asymmetric Digital Subscriber Line (up to 8 Mbits/s down)
	-HDSL	High-bit-rate DSL
	-RADSL	Rate-adaptive DSL
	-IDSL	Integrated DSL (-ISDN)
	-SDSL	Symmetric DSL
	-VDSL	Very-high-speed DSL (usually 13, 26, or 52 Mbit/s down)
	-xDSL	All other DSL technologies
	-PLC	Power-Line Carrier
Wireless	-MMDS	Multichannel Multiport Distribution System (2.5 GHz)
	-LMDS	Local Multiport Distribution Service* (28-56 GHz)
	-DBS	Digital Broadcasting Satellite (C_2, K_u, K_a bands)
	-DSS	Digital Satellite Systems (geosynchronous - GEOS, 12.5 GHz)
	-LEOS, LEOS	Low (Level) Earth-Orbit Satellite (e.g., Odyssey)
	-MEOS	Medium Earth-Orbit Satellite
	-WLL	Wireless Local Loop
	-FWS	Fixed Wireless Service (18, 23, 38 GHz)
	-Others	E.g., UNII** at 5 GHz), Hybrid Fiber/Radio

* In Canada, LMCS - Local Multiport Commun. System;
In Europe, MVDS - Multiport Video Distribution System

** In the United States, the Unlicensed "National Information Infrastructure Band"

ATTACHMENT 2

Comparative Assessment of Section 706 Advanced Telecommunications Capability Versus ADSL

Section 706 "Advanced Telecommunications Capability"	ADSL	ADSL vs. Section 706
• "High-speed"	• ~192 Kbps to 6 Mpbs downstream • ~16 Kbps to 64 Kbps upstream	• ADSL may or may not be "high-speed" downstream depending on characteristics of the copper loop. • ADSL definitely is not "high-speed" upstream.
• "Switched"	• Packet switched	• ADSL meets definition.
• "Broadband"	• ~192 Kbps to 6 Mpbs downstream • ~16 Kbps to 64 Kbps upstream	• ADSL may or may not be "broad-band" downstream depending on characteristics of the copper loop. • ADSL definitely is not "broadband" upstream.
• "Enables users to originate and receive high-quality voice, data, graphics and video."	• Asymmetric transmission with ~192 Kbps to 6 Mbps downstream and ~16 Kbps to 64 Mbps upstream.	• ADSL may or may not meet this requirement downstream depending on characteristics of the copper loop. • ADSL definitely does not meet this requirement upstream. High quality graphics and video require more than 64 Kbps upstream.

Senator BURNS. Mr. Daggatt, Teledesic Corporation.

STATEMENT OF RUSSELL DAGGATT, PRESIDENT, TELEDESIC CORPORATION

Mr. DAGGATT. Thank you, Mr. Chairman and members of the committee. It is a pleasure and honor to speak here today. My name is Russell Daggatt. I am president of Teledesic, and we are in the process of building a satellite system that will provide people in every part of the country and the world with affordable access to the most advanced communication services.

I would like to convey three messages to this committee today. First is that it is of the utmost importance that this committee and

the Government in general continue to promote universal access to advanced telecommunications capability.

Second, I will describe how the Teledesic Network's revolutionary new technology will be inherently capable of bringing these advanced services to all Americans, no matter where they live, without the need for special regulation or legislation.

Finally, I want to encourage this committee to endorse procompetitive and forward-looking policies that will allow teledesic and other advanced services to flourish.

The policy promoting universal access to telecommunications services in the United States is perhaps one of the great success stories of modern government. It is not just a matter of economic regulatory significance, but it is of profound social import as well, and its power comes from a very contemporary networking principle. That is, the value of a network increases exponentially with the number of nodes in the network.

To put it another way, the telephone system is made more valuable for everyone by virtue of its ability to reach your mother in Montana.

Perhaps the biggest policy challenge in telecommunications today is how to extend the universal service principle to advance broadband access while placing greater reliance on deregulated competition.

For conventional wire line technologies, these goals would appear to be in conflict. The challenge is to find ways to extend broadband access to the underserved areas in a manner that is economic in its own right.

In urbanized areas, communications companies are racing to build ADSL cable modems, fiber optic and terrestrial wireless networks to serve the growing demand for broadband access, but step out of the cities, and these fiber-like communications services become prohibitively expensive or are simply unavailable at any price.

Internationally, the situation is even more extreme. Most of the world does not have access to even basic telecommunications, but even in this country, when it comes to broadband access in the local access network we are virtually starting from scratch.

There is a lot of fiber out there now, and there will certainly be a lot more before Teledesic is up and operational in 2002, but that fiber is largely in the trunking networks connecting countries and telephone company switches, and it is in those trunking networks where you can aggregate heavy continuous traffic from a lot of sources and take full advantage of the gigabit per second, or soon terabit per second speeds of fiber.

The challenge is to extend that to the local access network where those economics of shared bandwidth break down.

The lower orbit satellite technology that Teledesic proposes is inherently egalitarian. It will provide the universal access that need not be mandated by regulation or legislation. Rather, it is inherent in the technology.

To understand this technology, it is necessary to distinguish among different types of satellite systems. For 30 years of commercial satellite communications, geostationary satellites have been essentially the entire relevant universe. These geostationary sat-

ellites hover one point over the equator at 22,300 miles. That is where the orbit is 24 hours.

But even at the speed of light, round trip communications through a geostationary satellite entail a minimum delay of at least a ½ second. This latency causes the annoying delay in intercontinental phone calls which impedes understanding and distorts the nuances of speech, but what can be an inconvenience for an analog phone conversation can be untenable when it comes to videoconferencing, or, more importantly, many of the most common data applications, including the protocol underlying the Internet.

By contrast, Teledesic satellites will orbit 25 times closer to the Earth than traditional geostationary satellites. This nongeostationary or lower Earth orbit allows the Teledesic system to provide service that has the same essential characteristics as fiber.

But there is another aspect of this lower Earth orbit satellite technology that I would like to emphasize, and that is, as soon as you come out of the geostationary orbit, by definition the satellites move in relationship to the Earth, so to provide continuous coverage of any single point on Earth requires in effect global coverage.

That is what I mean when I emphasize that the technology is inherently egalitarian. Teledesic will provide the same quality and capability and capacity of service to the least developed areas as it will to the most advanced parts of the world and the country on day one of service.

There are other compelling reasons why this LEO technology is necessary in order to provide these kinds of satellite services, and it flows from the Internet model in which all applications are moving onto a common network platform.

Closed proprietary networks and applications-specific networks do not have much of a future. PC's, whose capabilities are increasing exponentially, are driving the applications that are setting the standards for the networks, and in this model you need to design the network for the most demanding application, not for some subset of applications or even the average application.

Without knowing for certain all the applications that will be developed for the broadband networks of the 21st Century, it is reasonable to assume that those applications will be developed for the fiber networks on the ground, and in order to ensure seamless compatibility with those fiber networks, it is important that a satellite system have the same essential characteristics as those fiber networks.

Systems like Teledesic provide an exciting glimpse into the future of the Information Age. At Teledesic, we are poised to begin serving the public. We are moving forward with construction and have received most of the necessary authorizations from the FCC and the International Telecommunications Union, which regulates spectrum internationally.

As we proceed with the exciting work of deploying our system, we hope that this committee and the Government in general will do what it can to promote policies that will, to use the language of section 706, encourage the deployment on a reasonable and timely basis of advanced telecommunications capabilities to all Americans.

That means that the Government should promote a competitive telecommunications market in which regulatory hurdles are kept to the minimum and technologies that promote universal access are encouraged to flourish.

Thank you very much.

[The prepared statement of Mr. Daggatt follows:]

PREPARED STATEMENT OF RUSSELL DAGGATT, PRESIDENT, TELEDESIC CORPORATION

Thank you Mr. Chairman and Members of the Committee. It is a pleasure and an honor to be here to speak to you today. My name is Russell Daggatt, and I am President of Teledesic LLC. At Teledesic, we are in the process of building a satellite system that will provide people in every part of the country and the world with affordable access to advanced communications services. I want to convey three messages to this Committee today. First, it is of the utmost importance that this Committee and the government in general continue to promote universal access to advanced telecommunications capability. Second, I will describe how the Teledesic Network's revolutionary new technology will be inherently capable of bringing advanced services to all Americans, no matter where they live, without the need for special regulation or legislation. Finally, I want to encourage this Committee to endorse pro-competitive and forward-looking policies that will allow Teledesic and other advanced service providers to flourish.

As this Committee and other organs of the government consider how to promote advanced telecommunications in accordance with Section 706 of the Communications Act, it is of utmost importance that you continue to support universal access by all Americans and the new technologies that promote it. I want to emphasize to you that this is not just a matter of economic or regulatory significance, but it is of profound social import as well. The policy promoting universal access to telecommunications services in the U.S. is one of the great success stories of modern government. Its power comes from a very contemporary networking principle: The value of a network increases exponentially with the number of nodes in the network. Put another way, the telephone system is made more valuable for everyone by virtue of its ability to reach your grandmother in North Dakota.

For centuries, society has been organized around the economics of infrastructure. With the agricultural revolution, technology—seeds (as in the type you plant)—tied people to the land and brought them together in towns and villages. With the industrial revolution people came together in increasingly congested urban areas, all organized around the economics of industrial infrastructure—wires, rails, highways, pipes, and machinery. To the extent society's new transforming force—the information revolution—is tied to wires, it is just an extension of the industrial age paradigm. Like highways and railways, wires are rigidly dedicated to particular locations. If you live along side the mainline you prosper. If you live a few miles distant, you are left behind.

It is no longer sound—economically or environmentally—to force people to migrate to increasingly congested urban areas in search of opportunity. The real potential of the information age is to find a means of allowing people to choose where they live and work based on things like family, community, and quality of life rather than access to infrastructure. We've done a very good job extending "one-to-many" communications to most of the world. That is what the broadcast technologies are all about. Now, we need to create two-way network links that allow people to participate economically and culturally with the world at large without requiring that they pick up and move to where the infrastructure is.

The convergence of computing and communications is causing all things we associate with a high standard of living—from education and health care to economic development and public services—to become increasingly dependent on the flow of information. In urbanized areas, communications companies are racing to build fiber optic and terrestrial wireless networks to serve the growing demand. But step out of the cities, and these fiber-like telecommunications services become prohibitively expensive or are simply unavailable at any price.

The advantage of a system like Teledesic is that it can provide fiber-like service, but serve locations where fiber cannot economically reach. In fact, the terrestrial fiber networks and the Teledesic network will be complementary to one another. This is because it is just not economical in some situations to lay fiber optic cable in remote areas. Even in densely populated regions, extending the fiber network or even newly developed DSL technology the "last mile" to individual homes and offices may not make economic sense in many cases. The strength of the Teledesic Network is that it will provide universal access at a cost independent of location. It will be

no more difficult or costly for Teledesic to serve remote regions of Alaska or Montana than to serve midtown Manhattan or downtown Washington, D.C. In this sense, the Teledesic technology is inherently egalitarian. It will provide universal access that need not be mandated by regulation or legislation. Rather, it is inherent in the nature of the technology that traditionally under-served regions of the country and the world receive the same level and quantity of service as the most developed.

The solution we will bring into being is wireless access to advanced network communications. Unlike wireline technologies, the cost of wireless is largely indifferent to location. But in order to get the bandwidth required for fiber-like service through wireless means it is necessary to operate in a portion of the radio spectrum where sending signals horizontally over land is problematic due to interference caused by rain, terrain, foliage, and buildings. These technical issues limit the ability of cellular, PCS and the various other terrestrial wireless technologies to provide universal access to advanced telecommunications services. The solution the Teledesic Network adopts is simple: send the signals vertically. This leads us to a satellite-based network.

But not all satellite services are alike. Whereas most of today's satellite systems consist of "geostationary" satellites, the Teledesic Network is a low-earth-orbiting (or "LEO") non-geostationary system ("NGSO"). That is a mouthful of satellite jargon, but it is worth taking the time to explain the differences among satellite systems, and the revolutionary capabilities of the new systems. Traditional geostationary satellites ("GEOs") hover over one point on the equator at an altitude of about 22,300 miles. Even at the speed of light, round-trip communications through a geostationary satellite entail a minimum transmission latency—or an end-to-end delay—of approximately one-half second. This "latency" causes the annoying delay in many intercontinental phone calls, impeding understanding and distorting the nuances of speech. What can be an inconvenience on analog voice transmissions, however, can be untenable for videoconferencing and Internet applications. By contrast, the Teledesic satellites will orbit 25 times closer to the Earth than traditional geostationary satellites. Further, the Teledesic Network will consist of 288 satellites moving across the Earth's surface. This "non-geostationary" orbit allows the Teledesic system to provide high quality coverage throughout the world, with low delays, comparable to fiber. And, because Teledesic satellites move in relation to the Earth, continuous coverage of any single point on Earth requires, in effect, global coverage. Teledesic provides the same quality and capacity of service to all parts of the globe on Day One of service.

There are other compelling technical reasons why a LEO system is required in order to ensure universal access to advanced services: they flow from the Internet model, which is an open network that accommodates a whole variety of applications. Closed proprietary networks and application-specific networks do not have much of a future. PCs (whose capabilities are increasing exponentially) are driving the applications that are setting the standards for the networks. In this model, you need to design the network for the most demanding application, not some subset of applications or even the average application.

Without knowing for certain all the applications and data protocols a broadband network will be called upon to accommodate in the 21st century, it is reasonable to assume that those applications will be developed in urban areas—where fiber-optic networks set the standard. To ensure seamless compatibility with these terrestrial broadband networks, a satellite-based broadband access network should be designed with the same essential characteristics as fiber networks—broadband channels, low error rates, and low delays. The idea is that users will not know or care whether their network includes a satellite link, or whether their communication is carried wholly by a fiber optic network.

When you are thinking about the satellite systems of today, it is important to remember that they are not all the same. Before, I mentioned some of the differences between geostationary satellites and low-earth-orbit non-geostationary satellites. Even among low earth orbit non-geostationary satellites, there are three types. The best way of distinguishing among these three LEO system types is by reference to their corresponding terrestrial services:

The so-called "Little LEOs," like Orbcomm, are the satellite equivalent of paging. They provide simple store-and-forward messaging. These systems offer low data rates but can provide valuable services in a wide range of settings, such as remote monitoring and vehicle tracking.

The so-called "Big LEOs" like Iridium and Globalstar, are the satellite equivalent of cellular phone service. They provide narrowband mobile voice service via satellite, but do not offer bandwidth or functionality comparable to fiber.

Teledesic is the third kind of non-geostationary low-earth orbit system—a broadband LEO system. It will provide the satellite equivalent of fiber, and will provide such services as broadband Internet access, interactive video, and multimedia at access speeds 2,000 times faster than today's standard analog modems. For example, transmitting a set of x-rays may take four hours over one of today's standard modems. The same images can be sent over the Teledesic Network in seven seconds. Due to the Teledesic Network's high elevation angle, the satellite dishes will be small, easy to install, and affordable.

All of these systems provide exciting glimpses into the future of the information age. At Teledesic, we are poised to begin serving the public. We are moving forward with construction, and have received most of the necessary authorizations from the FCC and the International Telecommunications Union ("ITU"), which regulates spectrum issues internationally. As we proceed with the exciting work of deploying our system, we hope that this Committee and the government in general will do what it can to promote policies that will, to use the language of section 706, "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to *all* Americans." (emphasis added). That means that the government should promote a competitive telecommunications market in which regulatory hurdles are kept at a minimum, and technologies that promote universal access are encouraged to flourish. We hope that the government will help Teledesic succeed in its mission of extending the benefits of the advanced information infrastructure to all Americans, no matter where they choose to live.

Senator BURNS. Thank you, Mr. Daggatt.

Mr. Jeffrey Eisenach.

STATEMENT OF JEFFREY EISENACH, PRESIDENT, THE PROGRESS & FREEDOM FOUNDATION

Mr. EISENACH. Thank you, Mr. Chairman. It is an honor for me to be here today, and I will summarize what is a fairly lengthy written testimony. I want to make four points quickly.

The first is, contrary to what often seems to be a food fight among the various industries before this committee and in this industry, we have experienced over the course of the past year or so at The Progress & Freedom Foundation a process which suggests that cooperation is, indeed, possible and that mutually acceptable solutions may be found.

Second, I want to make three points about why I think this cooperation is so important and why this issue is so essential, and then I want to very briefly offer some ideas about what might be done to solve what is a growing crisis in the market for bandwidth.

On the cooperation point, beginning last fall, we have conducted through The Progress & Freedom Foundation a series of meetings through an advisory group called the Digital Broadband Working Group.

It is comprised of a very broad range of companies, and we have had participation from long distance companies, from computer companies, from equipment companies like Mr. Regan's, from cable companies, from telephone companies, local companies, and so on and so forth, from the entire reach of this industry, and our deliberations have been dedicated to trying to devise a solution to the excess regulation which is slowing deployment of bandwidth.

Now, there are real issues, and there are real conflicts within that group, as you can imagine, and all of the various industries involved are, as they should on behalf of their shareholders, pursuing what is in their best interests, and you see a lot of that before the various hearings before this committee.

But what we have found, I am pleased to report, is, I believe that there is give on all sides of this issue, and I believe that as the

FCC considers these issues in the coming year and as this committee considers these issues, that it will find that it is possible to reach resolutions, maybe surprisingly so, that the difficult issues that are being put before you can, in fact, be resolved.

I want to especially thank, before I depart from that point, Sol Trujillo, the president of U S West Communications, and Lou Platt, the chairman of Hewlett-Packard, who have jointly coconvened this group, and I also want to say that the group does not agree at this point on anything, and may never endorse any specific recommendations per se as a group, so the rest of what I am going to say to you today is informed by all those deliberations but not representative of anyone's particular views.

Second, Mr. Chairman, and this is the single most important point I want to get across to you today, the digital economy is here. It has happened. We are not talking about technologies that may be deployed in the future. We are not talking about a phenomenon that may occur soon. We are not talking about something coming down the road.

The Commerce Department last week issued a study which I recommend most highly to all of you. Its conclusions or issues are conclusions which this committee should take to heart, beginning with the conclusion that 2 years ago, 3 years ago actually, in 1995, 41 percent of the economic growth in the United States was directly attributable to the information technology industry, 41 percent in 1995.

Those are real Government statistics, and they are not some numbers abeut how many people are logging on the Web pages or the amount of traffic over the Internet. All of those things are interesting. Forty-one percent of the economic growth in the United States in 1995 is directly attributable to information technology. This is not a science issue, it is not a technology issue, it is not a narrow issue about these industries and their competing needs. It is an issue about the future health of the U.S. economy.

My second point is that the rapid deployment of digital broadband networks is absolutely essential for that growth to continue, and I quote again from the Commerce Department's report. A fast, high bandwidth connection can make a vast difference in a person's willingness to access products and services electronically. The bandwidth of a consumer's connection to the Internet is a prime determinant of the products and services that can be delivered electronically.

The third point I would make is that speod is of the essence, and that there is a conflict here between two cultures. One culture is a communications culture, which is very familiar with the ways of Government because it has been a regulated industry for 70 years. The other is a computer culture which does not understand and is not very tolerant of regulatory delays.

And during all of these meetings we have had with various subgroups of the folks who have worked with us in this digital broadband group we have had a number of cathartic moments where suddenly things that were opaque became clear, and one of those, and the one that sticks most in my mind, occurred just a couple of months ago when a representative of a computer company was briefing a little subgroup on a new DSL standard that has

been adopted by Microsoft and Intel and Compaq and several of the local phone companies.

And the fellow finished with his briefing, explaining that its advantage was that it would make rapid deployment very possible, trucks did not need to roll to houses, he could actually put a board in a computer and out of that board a phone line would plug directly into the wall, and this would make possible very rapid deployment.

And one of the telephone company folks in the room said, well, what is the next step? Where do you need to go to get your approvals, and what bodies will be next ruling on this new standard that has been developed exclusively in the private sector?

The fellow from the computer company looked at his kind of quizzically and he said, there is no next step. We expect to have these computers in the stores by Christmas.

Now, Mr. Chairman, we are living in a regulatory communications world which does not understand the phrase, "in the stores by Christmas." We are living in a regulated environment in which the communications industry fantasizes about getting notices of inquiry and preliminary rulemakings underway by Christmas.

I would suggest to you that those two cultures are in conflict, and that the culture which is responsible for 41 percent of the economic growth in the United States in 1995 and probably more this year is the computer culture and the one that we need to emulate.

There are some comments in my testimony about how we might pursue that. I will not enumerate those here, but I do not believe there is a more important issue before this subcommittee, this committee, this Congress, this administration, and certainly this Federal Communications Commission, than moving forward to remove the regulatory barriers that are slowing down the one remaining substantial bottleneck to the growth of the digital economy.

Thank you very much.

[The prepared statement of Mr. Eisenach follows:]

PREPARED STATEMENT OF JEFFREY EISENACH, PRESIDENT, THE PROGRESS & FREEDOM FOUNDATION

Mr. Chairman and Members of the Subcommittee, it is an honor to appear before you today to discuss section 706 of the Telecommunications Act of 1996 and related bandwidth issues.

Before continuing, I should note that while I serve as President of The Progress & Freedom Foundation, a non-partisan research and educational institution, and also on the faculty of Harvard University's Kennedy School of Government, the views I express are my own and do not necessarily represent those of the Foundation, its board or other staff, nor those of Harvard University or the Kennedy School. I should note that, at the Kennedy School, I teach a course entitled "The Role of Government in the 21st Century," which touches on many of the issues you are considering today. Also, The Progress & Freedom Foundation is dedicated to studying the digital revolution and its implications for public policy, and has spent a good deal of effort during the past year examining issues related to this hearing.

Indeed, since September of last year, the Foundation has undertaken a major study of bandwidth issues. Donald McClellan—who until last week served as a Senior Fellow at the Foundation—has worked closely with me and with our Chairman, Dr. George A. Keyworth, II, in directing this study, and I have attached a copy of a paper he prepared on these issues late last summer. A more extensive study will be released by the Foundation in June of this year.

I would also like to point out that our work in this arena has been informed by an advisory group called the Digital Bandwidth Working Group. Convened by Hewlett-Packard Chairman Lewis Platt and US West Communications President Solomon Trujillo, this group has included representatives from every major sector of

the computing and telecommunications marketplace. A complete list of the individuals who have participated in our two major sessions is the second attachment to my testimony.

Also in this connection, let me reiterate that my remarks today represent my own views only. Neither the individuals participating in the Digital Bandwidth Working Group nor the institutions they represent have endorsed any findings, conclusions or recommendations from our work to date. At the same time, I want to thank all of the individuals and institutions that have participated in this effort—and especially Mssrs. Platt and Trujillo, whose foresight and leadership in convening this effort have been essential.

My testimony today is intended to provide a broad overview of the issues associated with Section 706 of the Telecommunications Act and the need for affordable digital broadband telecommunications services. It makes three broad points:

First, the emergence of a new digital economy is transforming—for the better—the way we produce wealth in the United States and around the world.

Second, rapid deployment of digital broadband networks is crucial to the continued health of the new digital economy.

Third, the creation of a free market in bandwidth is essential to achieve the rapid economic and technological progress the new digital economy demands.

From these points, I will offer some concluding thoughts suggesting a framework for public policy discussions regarding bandwidth issues.

THE NEW DIGITAL ECONOMY

In his 1993 book, Post-Capitalist Society, Peter Drucker—the pre-eminent management expert of the 20th Century—stated that "The basic economic resource—the 'means of production,' to use the economist's term—is no longer capital, nor natural resources (the economist's 'land') nor 'labor.' It is and will be knowledge." Indeed, Drucker argues, "knowledge is the only meaningful resource today."

These are strong words, but Drucker is by no means alone in reaching such a conclusions. From George Gilder to Alvin Toffler, from Peter Huber to Donald Tapscott, from Steve Forbes to Walter Wriston, thinkers and visionaries have increasingly reached the conclusion that changes in information technology are fundamentally altering our society. James Wolfensohn, President of the World Bank, has endorsed information and knowledge as the most essential tools to hasten the development of lesser developed and developing nations to more prosperous economies.

For some time now (the Tofflers, for example, published The Third Wave in 1980) the coming of the new digital economy has been a matter of prediction.

The most important single fact I hope to leave you with today is that the digital economy is no longer something to be discussed in the future tense.

Last week, the U.S. Department of Commerce issued an important new study, The Emerging Digital Economy, which bears careful study by all members of this Committee. A few of the conclusions from that study are worth repeating here:

- "In recent years, the expansion of the IT [information technology] industries have been responsible for more than one-quarter of real economic growth." Indeed, in 1995, the last year for which figures are available, the information technology industry accounted for 41 percent of overall economic growth.
- "In 1996, IT's share [of business investment in new equipment] rose to 45 percent. For some industries . . . IT equipment constitutes over three-quarters of all equipment investment." This figure has been rising steadily since the 1960s, but growth has accelerated significantly since the advent of the commercial Internet in 1993.
- "Forrester Research . . . estimated business-to-business transactions [on the Internet] would grow from $7.8 billion in 1997 to $326.4 billion in 2002. At the close of 1997, however, a single company, Cisco Systems, was already reporting a run rate of $3.2 billion in network equipment sales from its Web site." The growth of electronic commerce is literally outrunning the ability of statisticians to measure it.

What is important about these figures is that they are real—not projections, and not proxies. We are talking about real economic phenomenon, at the very core of today's American commercial system, as reflected in official economic statistics. And, these statistics do not begin to capture the enhanced competitiveness, productivity gains, employment effects and other less direct benefits of the digital boom now underway.

The digital economy is growing rapidly because of the economic benefits it provides to users. The Department of Commerce report discusses in some detail the sources of efficiency gains from digital commerce, from lower transactions costs to more rapid cycle-times and inventory savings. I will not repeat that discussion here. What is important is to recall that the decisions being made to invest in and deploy

information technology are private decisions made by independent welfare-maximizing agents in a free-market economy—that is, they are decisions that can be attributed presumptively to actual or potential gains in economic efficiency.

THE BANDWIDTH IMPERATIVE: DEPLOYING DIGITAL BROADBAND NETWORKS

The single most significant barrier to the continued expansion of the digital economy is the scarcity of digital broadband connectivity to homes and offices.

What do we mean by the words "digital" and "broadband"?

In this context, "digital" means that data in whatever form—audio (e.g. music, telephone conversations), video (moving pictures) or text (written words)—is converted into digital "bytes," which are then sent over a network, received at the other end, and converted back into a humanly-accessible form. Digital networks are generally "packet-switched," which means that the data, once converted to digital form, can be broken into packets, which travel to their destination by the most efficient path.

"Broadband" means, simply, that a lot of data can travel in a short period of time. Broadband networks have high carriage capacities, measured in millions of bytes per second (or more). "Narrow-band" networks, by contrast, carry data measured in thousands of bytes per second (or less). Broadband networks can carry the quantities of information now required by the digital economy. Narrow-band networks are simply not adequate.

To quote again from last week's Department of Commerce report,

> A fast/high bandwidth connection can make a vast difference in a person's willingness to access products and services electronically. An Internet user probably will not spend 46 minutes waiting for a 3.5 minute video clip (approximately the amount of video represented by a 10 megabyte file) to download, but would wait if it took only a minute or a few seconds to download the same file. *Thus, the bandwidth of a consumer's connection to the Internet is a prime determinant of the products and services that can be delivered electronically.* (Emphasis added.)

Unfortunately, the cost of digital broadband network services to businesses and consumers is prohibitive. A "T–1" connection to the Internet, capable of carrying roughly 1.5 megabytes of data per second (Mbps) today can cost as much as $2,000 per month or more. Even an ISDN connection, at 128 kilobytes (Kbps) is generally priced at $60+ per month—a price/quality combination consumers have not found especially attractive. Most consumers, and many businesses, today access the Internet through analog modems working over standard telephone lines—and offering throughputs of 56.6 Kbps under the best of circumstances.

Anyone who has ever waited for a Web page to download over an analog modem knows that 56.6 Kbps—more likely the widely derided "twenty-eight-dot-eight"—is simply not fast enough for today's Internet applications. And even these speeds often are not realized in practice.

A great deal of energy has been dedicated in recent months to attempting to determine "who to blame" for slowdowns on the Internet. Our research suggests that finger pointing is even less likely than usual to be a useful way of solving this problem.

The reason, simply put, is that the Internet is a seamless web (no pun intended), beginning inside the computer or other receiving appliance and ending at the server from which the information originates. The network is comprised of software as well as hardware, of telephone switches as well as modems, of routers as well as servers—of hard drives, busses, fiber, coaxial cable, fiber optic cable, computer chips and Ethernet boards. Research presented at one meeting of the Digital Broadband Working Group by Hewlett-Packard researcher Gita Gopal demonstrated that all of these components need to work together for high throughput rates to be realized.[1] This is an important point with respect to the issues that will be discussed below.

While all components must work together to achieve the rapid throughputs the digital economy now demands, there can be no doubt that the most pressing issue today is what has become known as "the last mile" problem. The fiber-optic cable that carries Internet backbone traffic is capable of multi-Gigabyte speeds, and the routers and other hardware and software components that make up the backbone are generally capable of delivering much faster throughput than analog modems or

[1] At The Progress & Freedom Foundation, we recently upgraded our computers from Intel Pentium © 75 Mhz.-based machines to Intel Pentium © 266 Mhz. machines, and simultaneously upgraded our network server. We estimate that the result has been to reduce wait-times for access to Web-based materials by an order of magnitude—even though no change was made in our T–1 connection to the Internet.

even ISDN lines are capable of carrying. For most users, most places, the main barrier to joining the digital revolution is high-speed access to the backbone.

Technological progress has now created technologies that can solve the problem of affordable last-mile access to the Internet.

• Much to the surprise of many observers, a new technology known as xDSL recently has made it possible for twisted-pair copper wire connections—the standard telephone wire installed in virtually all homes and businesses—to carry data at rates as high as 8 Mbps. While this technology probably cannot be affordably deployed in all instances,[2] it is estimated that between 20 and 70 percent of all telephone lines may be amenable to xDSL installation. US West Communications began "rolling out" ADSL services (one form of xDSL service) in Phoenix, Arizona last December.

• At the same time, cable modem technology—which allows the high capacity coaxial cable network to be converted into a two-way network and used to deliver high-bandwidth Internet services—has been tested, proven and moved into deployment. The current generation of cable modems are capable of delivering even faster speeds than xDSL—up to 10 Mbps. Cox Communications, TCI's @Home division and other cable firms are already making cable modem technology available to many of their customers.

• Satellite services are also capable of offering downstream access to the Internet, and will soon—with the deployment of Teledesic and other low-earth-orbit systems—be capable of offering high-speed two-way services. Currently, one satellite provider offers downstream access at 400 Kbps, with upstream access provided through a standard analog modem attached to a telephone line.

• Land-based wireless technologies, though limited today to 28.8 Kbps access, have the potential for 1.5 Mbps access in the near future.

These technologies all lie somewhere between the present and the immediate future. Even those furthest along—xDSL and cable modem technologies—are only now being tested in real markets under real conditions. We know the technologies work, but we know a lot less about robustness, costs, business models and—the most important factor of all, consumer willingness to pay.

What we do know is that both technology and the marketplace are moving very, very fast. Technologies that only recently were "on the drawing board" are now being deployed. The number of Internet connections is doubling every eighteen months, and the amount of traffic appears to be doubling every three months. The private sector appears willing to make very substantial investments in electronic commerce-based enterprises—which account for over 50 percent of all venture capital investments in the United States today.

In short, the communications marketplace is starting to look like the computer marketplace we are all so familiar with. After a century in which the most significant change in point-to-point voice communication was the introduction of touch-tone phones, communications companies are starting to function on "Internet time."

During the past several months, as we have met with participants in the Digital Broadband Working Group, there have been a number of cathartic moments, in which issues which previously seemed "opaque" suddenly became clear. None was more dramatic, however, than when a small group met to hear a briefing from a computer company representative on the impact of the new "DSL-lite" standard recently agreed to by Compaq, Intel, Microsoft and several local exchange carriers.

To make a long story short, the computer representative explained that the value of the new standard was to make possible immediate deployment of this particular variety of DSL service. "What's your next step?" asked one of the telephone company personnel in the room, suggesting that various additional approvals and so forth would no doubt be required.

"We expect to have computers [with the new technology] "in the stores by Christmas," came the reply.

For a communications industry accustomed to 36-month regulatory proceedings, the computer representative's reply was like being thrown into a pool of freezing water. "In the stores by Christmas" is not part of the communications industry culture. But in a converging environment—in the emerging digital economy—it's going to have to be.

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[2] To function at full potential, xDSL technology requires relatively short line drops, high-quality copper wires and certain other technical conditions which are not met for a significant proportion of current telephone connections.

A FREE MARKET FOR BANDWIDTH

A recent Wall Street Journal story[3] reports on an announcement by a major communications firm. The firm, the story says, "will begin deployment of "asymmetric digital subscriber line" service, or ADSL, beginning in June, pending approval by the Federal Communications Commission." (Emphasis added.)

While I have no intention of oversimplifying the very complex issues that must be addressed to create a free market for bandwidth, I also want to state at the outset that there is something fundamentally wrong with the phenomenon reported above. The digital economy is exploding, creating enormous benefits. Affordable broadband services like ADSL are urgently needed to support its continued growth. Consumers everywhere complain of inadequate bandwidth. A private firm stands prepared to invest hundreds of millions of dollars to provide a cutting edge service that addresses these needs. And a five-member independent regulatory commission stands in the way. Why?

The answer, of course, is that the telecommunications industry is in the midst of a painful transition from a heavily regulatod, perhaps "natural" monopoly, to a competitive industry. The transition, set in motion by the Telecommunications Act of 1996, is going slowly—more slowly than many had hoped. Individual firms, and industries, seek to influence the pace and shape of the transition to achieve competitive advantage. And Congress, when it passed the Telecommunications Act, left more than a few of the details to be decided later.

Much of the debate about the transition represents the continuation of age-old battles. Long-distance telephone companies fear that local exchange carriers will use their customer lists and their control over the "local loop" to compete unfairly for inter-LATA business. Cable television companies worry that regulation will provide unfair advantages to satellite providers of television programming, and broadcasters worry about the growing market share held by cable. Everyone fears that the "universal service" system that subsidizes phone rates for some by levying de facto taxes on others is unsustainable, or simply inconsistent with a competitive environment in which prices presumably would reflect marginal costs.

As new technologies have emerged, new conflicts have emerged with them. Internet Service Providers worry that they may be charged access fees—like long-distance companies—for their use of the local exchange carriers' lines. Qwest and similar companies have added yet another dimension to the debate by offering—sooner than many expected—long distance telephone services that utilize digital broadband networks (i.e. the Internet backbone), and hence bypass much of the existing regulatory structure.

Simply keeping track of the developments in these areas is a full-time job. Wise, considered decisionmaking often seems impossible.

What should Congress—or the FCC—do about the urgent need for investment in and deployment of digital broadband networks?

The report we at The Progress & Freedom Foundation will issue in June will address this question in great depth. Let me simply suggest some principles.

Principle #1: Communications and computing are converging towards a single marketplace for content, communications and computing, and the current balkanized model of regulation is becoming simply unsustainable. The computer industry has thrived in the United States because the United States government has had the wisdom, by and large, not to try to regulate or control its growth. As regulation adapts to the new realities of the marketplace, the model that should prevail is the computer model.

Principle #2: Every regulation creates a constituency, a set of beneficiaries who have a stake in preserving the regulation. Such constituencies make legitimate arguments that they have relied in good faith on the regulatory environment, have structured their business (or their lives) accordingly, and will suffer from any change. If the end goal is deregulation, therefore, passing new regulations is not a good way to get there.

Principle #3: The Internet is global in nature, and the digital broadband networks growing up to service it are unbounded by traditional geographical lines. Responsibility for moving from a regulated to a market-based environment lies, accordingly, with the Federal government and, eventually, in the Federal government's relations with foreign nations and international governing bodies. It does not lie in statehouses, and certainly does not lie in city halls or county office buildings.

Principle #4: Incumbent providers of both cable television and local telephone service have some market power today by virtue of their control, respectively, of coaxial and copper cable "to the home." While some regulation—such as the existing

[3] April 13, 1998, p. B8.

access and unbundling requirements—makes sense to limit the exercise of this market power, care should be taken that regulations do not limit incentives for new entrants (or incumbents) to invest in facilities needed to provide digital broadband services.

Principle #5: Time is of the essence. For digital broadband networks to evolve at the pace required by the digital economy, they need a stable institutional environment in which all, or almost all, decisions are made without regulatory delay. Internet time and FCC time are measured in different units—one in hours, days and weeks, the other in months and years. The FCC was not designed to make decisions in Internet time. Neither were state public utility commissions, or county boards, or city councils. Only the market can meet the digital economy's "need for speed."

SUGGESTIONS FOR POLICYMAKERS

These principles lead directly to some suggestions for action:

First, the FCC should expedite its consideration of the section 706 petitions that have been filed by a number of local exchange carriers. Removing the regulatory impediments that are slowing investment in and deployment of digital broadband networks is an urgent national need that demands immediate attention.

Second, the FCC should construe its role vis-a-vis these petitions broadly. Removing Federal barriers (e.g. Inter-LATA restrictions) that inhibit ILEC efforts to deploy broadband networks may do little to ease impediments and delays that result from state regulations. Similarly, removing impediments to ILEC deployment does nothing to address the regulatory impediments faced by cable television operators deploying the same or similar services.

Third, in examining these issues, the FCC should look carefully at the need to retain existing restrictions, or impose new ones, to inhibit the exercise of monopoly power by ILECs or by cable system incumbents. The goal here should be to create an open competitive environment in which bottleneck facilities are available to all competitors (new entrants as well as incumbents) on an equal basis. What the FCC should not do is try to create the mythical "level playing field"—a market in which no one is allowed to have any advantages at all.

Fourth, and finally, Congress must begin immediately to examine telecommunications policy in light of the emerging digital economy and the rapid convergence of the communications marketplace. Old barriers between industries are breaking down far more rapidly than the Telecommunications Act of 1996 could have envisioned, and the transition to a market-based environment the Act did envision is taking far too long. In the bandwidth arena, this means looking especially at our policies regarding universal service and seeking new approaches that do not have the market distorting effects of the current regime.

CONCLUSION

Earlier in my testimony, I indicated that there is one fact, above all, that I would ask members of this Subcommittee, to take away: The digital economy is not something that is "coming," it is not "on the horizon" or "just around the corner." It is here. It is our economy, today, right now.

Creating a market-based environment for the digital broadband services our economy needs to prosper is perhaps the single most urgent policy issue before this Subcommittee, this Committee, this Congress and this Administration. I applaud you for dedicating your attention to this issue this morning. I urge you, on behalf of every American who likes having the Dow at 9000, the budget deficit at zero and the American economy dominant in the world to continue giving this issue the attention it needs and deserves.

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear today. I look forward to addressing any questions you may have.

Attachment 1

THE PROGRESS & FREEDOM FOUNDATION

Progress On Point

Release 4.5 August 1997 Periodic Commentaries on the Policy Debate

A Containment Policy for Protecting the Internet from Regulation: The Bandwidth Imperative

by

*Donald W. McClellan, Jr, Esq.**

SUMMARY

Policymakers are faced with a choice. Should the Internet be regulated like the telephone business, or should the market be allowed to function, as has been the case with computers? Congressmen Billy Tauzin (R-LA) and Senator Conrad Burns (R-MT) have rightly concluded that markets, not regulation, should be the rule. Earlier this week, Mr. Tauzin, the chairman of the House Subcommittee on Telecommunications, along with such powerful co-sponsors as House Internet Caucus co-chairs Rick Boucher (D-VA) and Rick White (R-WA), Mike Oxley (R-OH), Vice-Chairman of the Telecommunications Subcommittee, and Chris Cox (R-CA) introduced H.R. 2372, The Internet Protection Act of 1997. Senator Burns, who chairs the powerful Senate Subcommittee on Communications, is developing similar legislation.

The aim of both bills is to preclude the Federal Communications Commission (FCC) or State public utility commissions (PUCs) from imposing regulations on the "high-bandwidth" telecommunications technologies needed for the promise of the Internet to be realized.

Reasonable arguments can be made for temporary, transitional regulation needed to introduce competition into telecommunications markets where government policy systematically precluded competition thereby perpetuating the natural monopoly myth -- notably the market for local telephone service.[1] But that regulation should not be allowed to spill over onto the Internet and technologies needed to provide broader bandwidth access to the Internet, where it could retard innovation, investment and progress.

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* Mr. McClellan is Senior Fellow For Communications Legal and Policy Issues at the Progress & Freedom Foundation. Previously he served as Senior Republican Communications Counsel for the United States Senate Committee On Commerce, Science and Transportation during consideration, passage and enactment of the Telecommunications Act of 1996.

1 However, such regulation should be as broad and permissive as possible. *See, e.g.,* George A. Keyworth, II and Jeffrey A. Eisenach, *The FCC and the Telecommunications Act of 1996: Putting Competition on Hold?,* Progress on Point No. 2.1, October 1996.

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HOW THE INTERNET CHALLENGES POLICYMAKERS

The history of the Internet is being written in real time. Sparked by Netscape founder Mark Andreeson's "Mosaic" browser -- introduced in September 1993 -- the Internet has emerged in just four short years as the dominant fact of world commerce and culture. In that time, it has gone from the laboratories of a few government-funded scientists into 50 million North American homes and businesses (and tens of millions more around the world). Computer sales now outstrip sales of televisions, and more information is carried over the Internet than all the world's telephone systems combined.

For policymakers, the growth of the Internet presents two challenges. The first is the speed of its development. Since the early days of the Industrial Revolution, when railroads and factories spread almost as fast as the Internet is spreading today, legislators and policymakers have grown used to a relatively stable world. Jobs were created in factories, output was measured in tons, last year's Fortune 500 was sure to look pretty much like next year's. Policy could respond appropriately -- and that meant slowly. But today we are in the midst of another revolution, the Digital Revolution, and policymakers are just beginning to adjust to the change of pace. Those who favor regulation are already eyeing the Internet as a new and rich target;[2] those who prefer the market must move quickly to forestall potentially destructive government intrusion.

The second challenge is in the nature of the Internet itself. It represents the marriage of two very different industries, computing and telecommunications -- or, as George Gilder has labelled them, the "microcosm" and the "telecosm."[3] Combining the computing power of the microchip with the communications power of telephony, co-axial cable, fiber optic cable, wireless radio and satellite communications, the Internet is weaving a seamless web of knowledge that encircles the globe and brightens the future for all.

For policymakers, the question is how the Internet should be treated. It is neither computing nor communications, neither "point-to-point" nor "broadcast."[4] In a policy world that has always treated telephones as telephones, televisions as televisions and computers as -- until now -- something to be left alone, policymakers must decide how, if at all, the Internet is to be regulated.

If policymakers follow the computer model, they will allow the market to function. But some are arguing that the Internet is simply an extension of the telephone system, and that pricing and technological decisions need to be made by regulators in Washington or the State capitals.

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2 As former FCC chief counsel Bob Corn-Revere writes in his recent book, *Rationales and Rationalizations*, "The culture of regulation already is marshaling its forces for a multi-faceted assault on Internet freedom."

3 See George Gilder, *The Meaning of the Microcosm* (Washington: The Progress & Freedom Foundation, 1997).

4 It is worthy of note that the Supreme Court, in its landmark Communications Decency Act opinion, *Reno v. ACLU*, concluded that the Internet is clearly *not* like broadcasting, and hence is subject to a degree of First Amendment freedom similar to that applied to the print press.

THE CONVERGENCE OF COMMUNICATIONS AND COMPUTING

The telecosm and microcosm of communications and computer technologies has become the core backbone for the emerging "Information Economy" in 21st Century America. With the accelerating pace of digitization in the communications sector, the long-predicted convergence of communications and computers is proceeding. This convergence phenomenon is crystallizing the complementary nature of these previously separate industry segments. Computer applications are becoming increasingly dependent on telecommunications networks. As a result, it follows that innovation of new computer hardware and software will be driven in part by the ability of telecommunications network providers to deploy the greater bandwidth needed to take full advantage of the many exciting and new network-centric computer applications – at dramatically improved price-performance ratios.

Today, unfortunately, the pace of innovation in the telecommunications sector is substantially slower than the rapid rate of change in the computer sector. This is due, in large part, to the heavy regulation of the telecommunications industry at both the federal and state level – a problem which has, in fact, been exacerbated with the implementation activities related to the Telecommunications Act of 1996.[5] Regulation has made it increasingly difficult for telecommunications network providers to appropriate a reasonable share of the commercial value derived from new telecommunications service features, functions and applications. Absent an ability to recover the high front end costs of developing new software-based service features, like ADSL (Asynchronous Digital Subscriber Line), or deploying broadband capacity, such as single mode fiber optics or ATM (Asynchronous Transfer Mode) switches, telecommunications network providers incentives to innovate are substantially reduced.

Free market advocates have sought to contain and eliminate unnecessary communications industry regulation – to simply get government out of the way – for at least two related reasons. First, as communications and computers converge, any unwarranted regulation of communications could spill over and result in federal regulation of the computer sector. This would have potentially disastrous consequences for this high-tech, growth industry, not to mention the American economy. Second, as computer applications including the Internet become increasingly dependent on communications links, any inefficiencies in communications due to unwarranted regulation will ripple throughout the computer industry, impairing its productivity, competitiveness, and growth.

To emphasize the importance of these points consider that the personal computer industry – software, hardware and on-line community -- now generates as much revenue as the entire telephone industry. It took the phone companies 100 years to reach this point while the personal computer industry has taken less than two decades. The combined market capitalization of computer industry leaders Microsoft and Intel is now just slightly less than the market capitalization for entire U.S. regulated telecommunications sector.

Moreover, and more profound, is the fact that, according to *Barrons*, growth in the computer industry currently accounts for two-thirds of the U.S. gross domestic product growth. The difference, of course, is that the telephone industry was heavily regulated at the federal and state level for all of these years and competition was systematically precluded by that same

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5 See Donald W. McClellan, Jr., *The FCC's $13 Billion Tax Hike*, Progress on Point 4.1, June 1997.

government regulation. Meanwhile the computer industry flourished outside the reach of the long arm of government regulation.

Given that innovation and growth in the computer sector is a key driver of productivity and real growth in the general economy, it is imperative that national telecommunications policy encourage, or at least not discourage, telecommunications network providers from developing and deploying network bandwidth technologies and services that computer users will need to derive full value from subsequent generations of computer technology. The Telecommunications Act of 1996 was designed, in large measure, to open all communications markets to competition as the most efficient means of promoting modernization of networks which are increasingly important to continued growth in the computer sector. Yet FCC implementation activities have actually dampened modernization activity.

It has recently been suggested that a "Silicon Valley Model" for the telecommunications industry would (1) accelerate the industry's technological progress by 20% per year or more, (2) raise productivity growth in the entire U.S. economy by 1% per year or more (which would represent a doubling of recent productivity growth), and (3) increase global productivity.[6] This is so because the price-performance of local, digital telecommunications services is becoming a bottleneck to the future progress of the Internet. In turn, improvements in Internet-related and other digital information services is becoming the driver for growth in the computer sector.[7] As we have already seen, progress in computing and telecommunications is the key driver for the broader U.S. economy.

To the extent that communications regulatory actions at the federal and state level discourages network investment and modernization, therefore, it is safe to assume that the adverse consequences of those decisions will ripple through the computer sector and the rest of the economy.

THE CONTAINMENT POLICY CHALLENGE: SUPPORTING THE DEPLOYMENT OF HIGH BANDWIDTH TELECOMMUNICATIONS SERVICES

As a result, a new approach – a containment strategy – is needed to limit what government at both the federal and state level can do to cause regulatory harm to the computer sector, especially the Internet – and to limit and contain the damage to the telecommunications sector. Thus, instead of needlessly spinning our wheels on revisiting the battles at the heart of the Telecommunications Act of 1996, let us contain the damage and specifically preclude any further regulatory encroachment into the brave new world of the Internet and advanced information services.

What is needed is a simple, yet profoundly bold legislative proposal – a new section of the Communications Act – specifically eliminating any and all federal and state regulatory authority over any "advanced information service." "Advanced information service" would be defined to include the Internet, Internet access services, on-line services, information services or value added services. All of these new value added services refer to new network features and applications that enable consumers to perform new functions with the telecommunications network. High speed Internet access using asynchronous digital subscriber line (ADSL)

6 *See* Charles H. Ferguson, *The Internet, Economic Growth, and Telecommunications Policy* (April 14, 1997).
7 *Id.* at p. 5.

technology is a prime example. ADSL is a digital compression technology that enables users to send and receive data over local telecommunications networks at much higher speeds (4 to 6 Mbps) than can be accomplished utilizing standard 28.8 Kbps computer modem. ADSL is 50 times faster than conventional dial up modems.

Freeing new service features, functions and applications from regulation will greatly increase incentives on the part of enhanced service providers, Internet service providers, and telecommunications network providers to invest in advanced technology and innovative new service features, functions and applications. Additionally, as telecommunications carriers upgrade their core networks to accommodate new unregulated service features, functions and applications like ADSL, those same network improvements will add to the quality of the basic voice grade telephone service that remain under regulation.

A savings clause would be included such that nothing in the new section shall affect the requirements of Parts II and III of Title II of the Communications Act of 1934. Thus none of the interconnection, unbundling and resale provisions of the Telecommunications Act of 1996 as it applies to basic telecommunications services will be disturbed. Moreover, provision for safeguards protecting against discriminatory or cross-subsidizing behavior would be maintained. A coalition of the leading telecommunications and computer industry representatives would be formed to actively press for passage of the legislation.

The purpose of this new initiative is to promote the development of advanced, digital information services including, most importantly, high speed access to the Internet for residential and small business consumers. It would accomplish this by deregulating, at the federal and state level, all new value added information service features and applications that make use of, and are carried over, regulated basic telecommunications networks. Given the prospect of retaining a larger portion of earnings from successful value added services like ADSL, telecommunications carriers, in particular, are far more likely to incur the up front risk and cost to deploy these new, greater bandwidth services. Internet users benefit by having a choice between accessing the Internet over regulated basic telecommunications networks or through unregulated value added, higher bandwidth applications like ADSL.

As exponential growth in demand for Internet services continues to reshape the face of telecommunications and computing, Internet service providers and local telecommunications network providers will need the flexibility this new containment policy initiative provides to experiment with new models for providing and pricing greater bandwidth that Internet users will continue to demand. In particular, the flexibility the market will provide under this initiative will permit the balancing of the telecommunications network provider's need to recoup the cost of deploying advanced network technologies together with the Internet community's desire to keep the Internet free of toll or other usage based charges while gaining ever greater bandwidth. At a minimum, new business models will need to be developed by the network providers in responding to Internet user requirements which will clearly differ from the packaging and pricing of basic telecommunications services.

By removing the federal and state regulators from this process, up front, the appropriate incentive signals will be unequivocally conveyed to the market so that advanced services deployment will go forward immediately rather than risking further delays and costs associated with regulation. As we have seen, Telecommunications Act implementation is giving rise to more, not less, regulation. The FCC is thus discouraging investment in broader bandwidth

technologies and services like ADSL. Such value added services are urgently needed to evolve the Internet and other on-line services into something far more promising than they are today.

This initiative will have the added benefit of moving beyond the enhanced service provider (ESP)/Internet service provider (ISP) access charge exemption debate which has caused an unnecessary fissure between the telecommunications and computer sectors. Moreover, and more significantly, by encouraging telecommunications network providers to accelerate deployment of broader bandwidth service applications like ADSL, this containment policy would have a very favorable impact on continued innovation and sales of computer hardware, software and on-line services which, as noted above, already accounts for a large percentage of GDP growth. As a result, there would be no need for separate access charges. The containment policy initiative could thus unite the telecommunications and computer industries behind a common purpose.

THE POLICY CHOICE: REGULATION OR THE MARKETPLACE?

Which approach is more likely to provide the high-bandwidth services all are agreed are essential for the digital revolution to continue apace, regulation or the marketplace? Two key members of Congress, Senator Conrad Burns (R-MT) and Representative Billy Tauzin (R-LA), chairmen of the Senate and House communications subcommittees -- along with important co-sponsors from both parties -- are boldly casting their lot with the marketplace by moving forward with legislation modeled after the containment policy idea.

Congressman Tauzin recently introduced legislation, H.R. 2372, The Internet Protection Act of 1997, designed "to ensure that the development of the Internet and interactive computer services is unfettered by Federal and State regulation." Joining Chairman Tauzin in introducing this legislation were Congressman Rick White (R-WA), co-chairman of the Congressional Internet Caucus and a long time champion of Internet deregulation, Congressman Rick Boucher (D-VA), co-chair of the Congressional Internet Caucus and long time bandwidth proponent serving on both the House Commerce and Judiciary Committees, and Congressman Chris Cox (R-CA), author of the Internet Tax Freedom legislation in the House.

As Chairman Tauzin explained when announcing H.R. 2372's introduction: "The quickest way to kill the Internet is to allow local and state governments to begin adopting unnecessary rules and regulations...In my opinion, we should have a free trade zone in cyberspace. By passing this important legislation, we will be sending a signal to other countries around the world that they should proceed cautiously with respect to Internet regulation." Congressman White added that: "It's time for a new approach. The unregulated growth of the Internet should be our new measure for creating more competitive markets. This bill is designed to move us away from our existing regulatory model and toward a new, more innovative approach to our future." Finally, Congressman Boucher emphasized that in carrying out "our bill's express recognition of the Internet's 'deregulatory leverage' we will promote parity among service providers and provide strong incentives for technological innovation, economic efficiency, user choice and high service quality."

The Internet Protection Act creates a new Section 231 of the Communications Act of 1934. In order to achieve rapid and efficient technological and commercial deployment of new digital information services, the bill unequivocally and boldly states that "it shall be the policy of the

United States to rely on private initiative and to avoid, to the maximum extent possible, government restriction or supervision of such services." Regulation of Internet information services is found not to be in the public interest in H.R. 2372. Moreover, Federal and State authorities are instructed to support the position that the Internet should be free from regulation in international fora.

The legislation specifically precludes Federal Communications Commission and State regulatory authority with respect to (1) "the rates, charges, practices, classifications, or services," (2) "technical specifications or standards," or (3) "any other regulation of the provision" of Internet information services." "Internet information services" include all "information services," which are defined in the Communications Act of 1934 as "the offering of a capability for generating, acquiring, storing, transforming processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications system." Thus, Tauzin's legislation specifically precludes FCC regulation of the Internet, provision of access to the Internet and access software for the Internet, as well as interactive computer services (e.g., on-line services), the provision of access to interactive computer services, and access software for interactive computer services.

Safeguards against incumbent local exchange carrier anticompetitive behavior are included in H.R. 2372 to preclude cross-subsidizing and discriminatory behavior. The key procompetitive provisions of Parts II and III of Title II of the Communications Act are specifically preserved, most importantly Section 251 and 252's interconnection and unbundling regime.

In order to expedite deregulation across all telecommunications and media offerings, the Internet Protection Act provides "deregulatory leverage" for Internet information services. As a result, in the event that services being offered over the Internet are comparable to regulated services under Title II (telecommunications services), Title III (spectrum, including broadcast, services), or Title VI (cable services), the Tauzin bill in Section 231(C) establishes a framework for the FCC to forebear from applying regulation under the Communications Act. The forbearance standard is strikingly similar to the forbearance language in Section 10 of the Communications Act, which was added by the Telecommunications Act of 1996. Thus, forbearance is permitted if (1) regulation is otherwise unnecessary to ensure that rates are just and reasonable, (2) enforcement of a provision of the Act is not necessary to protect consumers, (3) forbearance is consistent with the public interest, and if (4) forbearance is necessary to promote parity between different industry competitors.

Finally, given the recent FCC proclivity to ignore the intent of Congress on national telecommunications and information technology policy, the legislation wisely and explicitly provides that in the event the FCC ever wishes to regulate the provision of Internet information services, then it must report to the Congress and make recommendations for appropriate legislative changes. Thus, H.R. 2372 unambigously declares that only the Congress can modify the clear deregulatory thrust of the legislation.

Senator Conrad Burns (R-MT), chairman of the U.S. Senate Communications Subcommittee and long time leading Congressional advocate for broader bandwidth deployment, is moving forward simultaneously with similar legislation in the Senate. In addition to the issues addressed in the Tauzin legislation, Burns is likely to address an issue of critical importance to the computer and information technology industries. Section 251 of the Communications Act,

added by the Telecommunications Act of 1996, lays out the interconnection, unbundling, and collocation rights for "telecommunications carriers." Section 251 leaves as an open question whether independent information service providers have these "carrier" rights. The FCC, in its Interconnection Order implementing Section 251 and 252, decided that information service providers do not have Section 251 interconnection, unbundling and collocation rights. The Commission reserved the right to revisit this issue should procompetitive circumstances warrant such action.

Senator Burns' containment proposal could circumvent some of these problems by classifying Internet service providers as "telecommunications carriers" by virtue of their capability to carry Internet telephony and fax services. As a result, they could purchase unbundled loops from the incumbent local exchange carriers. Representative Edward Markey, ranking Democrat for the House Telecommunications Subcommittee, in separate legislation, H.R. 1964, simply extends the Section 251 and 252 regime to all information service providers without the attendant obligations of all other telecommunications carriers.

Both the Burns and Tauzin approaches merit careful examination, and each raises issues that deserve careful consideration. For example, if Senator Burns' bill takes the approach of reclassifying ISPs as telecommunications carriers, these services could become subject to the obligations of such "carriers," including contributions to universal service. Because the FCC has taken a heavily regulatory approach to universal service, levying huge new taxes to support a larger Federal government role in wiring schools, for example, such a re-classification could prove problematic for the ISPs. Nevertheless, it may be a price worth paying for the ISPs in order to secure full interconnection, unbundling, and co-location rights under the Telecommunications Act of 1996.

Similarly, Chairman Tauzin's bill may rely more heavily than is warranted on good-faith implementation by the FCC of the provisions related to deregulatory leverage provided by "comparable" services. The FCC's record in applying the forebearance authority given it under the Telecommunications Act in new Section 10 of the Communications Act of 1934 is worse than dismal: Virtually no significant rules have been repealed, despite Congress' clear intent that the authority would be used extensively. To the extent Chairman Tauzin's bill relies on the FCC's willingness to "forebear" from regulating, such confidence may prove to be misplaced.

Additionally, definitional changes may be necessary to ensure that digital, broader bandwidth technologies like ADSL are clearly outside the zone of regulation. One way to ensure that result, for example, would be the addition of "high speed data communications service" of a type not currently commercially available to the definition of Internet information services. That would ensure that the necessary additional infrastructure, including additional bandwidth, will be available to enhance access to the Internet.

These caveats aside, the legislation introduced by House Chairman Tauzin and under development by Senate Chairman Burns represents a clear endorsement of the marketplace over regulation to solve the bandwidth crisis. As Netly News Network correspondent Declan McCullagh writes, the Tauzin bill "stresses that industry, not government, should grow the Net." History tells us it is likely to be the right choice.

CONCLUSION

By reforming U.S. telecommunications policy in accordance with this new containment policy initiative, the 105th Congress has an unparalleled opportunity to unleash a digital, multimedia technology revolution in America. By freeing American technological know-how, it can help provide Americans with instantaneous access to, and manipulation of, a bounty of commercial, educational, entertainment, informational and health care applications and services.

As noted previously, it is now generally understood that computer hardware and software manufacturers and their customers will need access to substantially larger amounts of communications network bandwidth in order to derive full value from subsequent generations of computer hardware and software technologies. As computers become ever more network-centric with the continued explosive growth of the Internet, it also follows that productivity and real growth throughout the general economy will become increasingly dependent on the ability of communications network providers to deliver increasing amounts of bandwidth to computer users at increasingly affordable rates.

Debate over national communications policy, in general, and the proposed Internet protection legislation, in particular, should proceed with these considerations squarely in mind. Rather than continuing to dwell on issues like the enhanced service provider (ESP) exemption for access charges, regulators and key telecommunications and computer companies should be asking themselves what will it take for communications carriers to deliver greater bandwidth capacity at lower rates. For a variety of reasons highlighted above, deregulating new value added network service features, functions and capabilities like ADSL service would represent a tremendously positive step in this crucial direction.

This continuing deregulatory march recognizes the contribution that communications, computers and associated technologies make toward economic progress and individual empowerment. Telecommunications and computing technologies make individuals less dependent on government-controlled sources of news and information. Telecommunications and computing technologies also helped individuals work together independent of the totalitarian systems and structures that Communism long employed to maintain power. That same contribution toward greater freedom and individual empowerment that was so important to the United States and its Allies winning the Cold War, can play a major role in helping Americans break the excessive power and control now exercised by big government in Washington. Deregulation in telecommunications thus is a means of achieving both progress *and* freedom.

A private, non-profit, non-partisan idea center established in 1993, The Progress & Freedom Foundation studies the impact of the digital revolution and its implications for public policy. It brings together a diverse group of thinkers and policy experts and shares their work with the American people through seminars, conferences, publications and electronic media of all forms. Supported by tax deductible donations from corporations, foundations and individuals, PFF does not engage in lobbying activities or take positions on legislation.

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Attachment 2
Digital Broadband Working Group Briefing Attendees

Maggie Barrington		US WEST, Advanced Technologies
Thomas Barry	Senior Vice President, Federal Relations	SBC Communications, Inc.
Marc Berejka	Federal Regulator Affairs Manager	Microsoft
Robert Blau	Vice President of Executive & Federal Regulatory	BellSouth
Debra Brunton	State Affairs Representative	Microsoft
Philip Burgess	President and Chief Executive Officer	Center for the New West
Jeffrey Campbell	Manager, Federal Government Affairs	Compaq
Dave Charlton	Business Development Manager	Corning
John Charters	Vice President, Internet Services & Application Development	U S WEST Communications
Larry Clinton	Assoc. Vice President of Large Company Affairs	USTA
Scott Cooper	Government Affairs Manager	Hewlett-Packard
Ophyll D'Costa	Executive Director, Strategic Development	U S WEST Communications
David Dorman	Chief Executive Officer	PointCast, Inc.
Jeffrey Eisenach	President	The Progress & Freedom Foundation
Charles Eldering	Director, Advanced Systems Engineering	NextLevel Systems, Inc.
Robert Frankenberg	President and Chief Executive Officer	Encanto Networks, Inc.
Paul Fuglie	Assistant Vice President, Regulatory	GTE Corporation
Dick Green	President & Chief Executive Officer	Cablelabs
Don Gips	Chief Domestic Policy Advisor	The Office of the Vice President
Dennis Glaves	Assistant Vice President, Congressional Affairs	GTE Corporation
Gita Gopal	Department Manager, H-P Labs	Hewlett-Packard
Rob Griffen	Regulatory Counsel, Information Services Group	Bell Atlantic
Mike Grubbs	Director, Convergence Products	Gateway 2000
Tim Hackman	Director of Public Affairs	IBM
Christine Hemrick	Vice President/General Manager, Internet Appliances and Applications Business Unit	Cisco Systems, Inc.
Tony Hennon	Senior Vice President	Motorola
Grace Hinchman	Manager, Public Affairs	Digital Equipment Corporation
Link Hoewing	Director, Issues Analysis	Bell Atlantic
Laura Ipsen	Manager, Government Affairs	Cisco Systems, Inc.
Ted Jenkins	Vice President & Director of Corporate Licensing	Intel
George A. (Jay) Keyworth	Chairman	The Progress & Freedom Foundation
Robert Kirkwood	Director of Government Affairs	Hewlett-Packard
Kal Krishnan	Sr. Vice President & Chief Technology Officer	Encanto Networks, Inc.
David Krone	Vice President of Government Relations	TCI, Inc.
Mary McManus	Director of Federal Public Affairs	Lucent Technologies
Donald McClellan	Senior Fellow	The Progress & Freedom Foundation
Garland McCoy	Vice President for Development	The Progress & Freedom Foundation
Jill Murphy	Director of Communications	The Progress & Freedom Foundation
Alex Netchvolodoff	Vice President for Public Policy	Cox Enterprises, Inc.

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Robert Pepper	Chief, Office of Plans and Policy	Federal Communications Commission
Jeffrey Peters	Vice President, Digital & Applied Imaging	Eastman Kodak
Mike Pettit	Counsel	Spence, Fane, Britt & Browne
Lewis Platt	Chief Executive Officer	Hewlett-Packard
David Porter	Vice President Government Affairs	WorldCom
Bruce Posey	Vice President, Federal Relations	U S WEST Communications
Tim Regan	Vice President & Director, Federal Government Affairs	Corning, Inc.
John Robinson	Vice President, Strategic Planning	BellSouth
Daniel Scheinman	Vice President, Legal & Government Affairs	Cisco Systems, Inc.
Paul Shumate	Executive Director of Broadband Local Access	Bellcore
Michael Schwartz	Senior Vice President, Communications	CableLabs
Steven Stewart	Program Manager, Telecommunications Policy, Government Programs	IBM
Tim Stone	Vice President, Business Development	Motorola
Raymond Strassburger	Director, Government Relations-Telecommunications Policy	Northern Telecom
Lynn Streeter		US WEST, Advanced Technologies
Howard Symons	Partner	Mintz, Levin, Cohn, Ferris, Glovsky & Popeo, P.C.
Thomas Tauke	Senior Vice President, Gov. Relations	Bell Atlantic
Solomon Trujillo	President & Chief Executive Officer	U S WEST Communications
Jan Wadsworth	West Coast Counsel	America Online
Timothy Waters	Vice President, Data Product Management	Ameritech
Thomas Wheeler	President and Chief Executive Officer	CTIA
Bud Wonsiewicz	President	US WEST, Advanced Technologies
Joseph Zell	President, INTERPRISE Networking Services	U S WEST Communications

Senator BURNS. I am interested in what you said there, the one culture does not understand slow and the other one does, if you know what I mean.

Mr. David Finkelstein, senior vice president, marketing and business development, SkyBridge Limited Partnership.

STATEMENT OF DAVID FINKELSTEIN, SENIOR VICE PRESIDENT, MARKETING AND BUSINESS DEVELOPMENT, SKYBRIDGE LIMITED PARTNERSHIP

Mr. FINKELSTEIN. Thank you, Mr. Chairman. Thank you for granting me this opportunity to speak to you today. I am senior vice president of SkyBridge, and SkyBridge is a U.S. company planning to deploy a constellation of 64 satellites in low Earth orbit which my colleague explained to you to bring interactive broadband communications to the entire globe.

SkyBridge will create fiber-like connectivity for the provision of high-speed Internets, multimedia videoconferencing, and similar advanced applications.

I think that SkyBridge will be of particular interest to this committee for four different reasons. First of all, as a low Earth orbit system it is particularly attractive for these high speed, real time interactive communications that we have been talking about.

Second of all, through our strategic alliance with Loral's geostationary cyber star system we will be utilizing the best of both LEO and geotechnologies where each is most appropriate.

Third, because we will be providing only local access services, SkyBridge will be closely integrated with the existing telecommunications terrestrial carriers, and fourth, through our unique arrangement for frequency spectrum-sharing we are promoting a particularly efficient use of radio frequencies.

I would like to center my remarks today around the question of providing choice. New satellite technologies will provide many new choices to consumers, exactly the kinds of choices Congress had in mind when it passed section 706 of the Telecommunications Act requiring the accelerated deployment of advanced communication services to all Americans, as just about every speaker to you today has reminded us.

But there are a number of different definitions of choice, Mr. Chairman. In fact, it reminds me of the time not so long ago when I was driving through the great State of Texas and I drove by this roadside diner that had this enormous sign saying, Texas barbecue and choice of vegetables, $9.95. I drove in, sat down, ordered my steak medium rare, and of course waited for the waitress to tell me that today's vegetable was creamed corn, to which I asked, well, what was the choice, and she naturally responded, do you want 'em or not? [Laughter.]

Now, this is not exactly my idea of choice.

In the 1996 Act this Congress made a choice for the American people. It decided that everyone should have access to the information cornucopia that will feed economic growth and progress in the next century. The freedom of Americans to choose where to live, where to work, and where to raise their families has long been admired throughout the world. In fact, our national mobility sets us apart.

But if we fail to achieve that goal set by Congress in the 1996 Act, this historic freedom of choice could prove to be hollow. Why? Because today we are practicing geographic discrimination. Some areas of this Nation are simply not wired, and other wired areas are inadequate to support the infrastructure required by the Information Age.

Unfortunately, the required infrastructure improvements will be extremely expensive, and may well take decades, as we heard from Mr. Zell. I therefore urge you to ensure that all Americans—and I am referring to rural America, Senator Rockefeller—be able to choose where to live without having to worry about access to the information superhighway, or whether their children's schools will be wired.

SkyBridge will guarantee this choice by deploying advanced services that are available in all geographic areas, and I am not just talking about this simply 3-mile problem that you mentioned with this fancy DSL technology, which is to be encouraged.

We are talking about up to 450 miles that covers not just that 3-mile gap, but the distance to backhaul the traffic to the central offices that are equipped with broadband fiber, so that no matter where a citizen chooses to live or work, they will benefit from instant, affordable access to the information superhighway.

As Congress recognized, a critical means of achieving the 1996 Act's goals is to ensure choice of service providers. A major goal of the Act was to provide choices, i.e. to ensure competition, particularly in the local communications markets.

SkyBridge will help to achieve that goal by providing an alternative to the incumbent local exchange carriers with respect to local access infrastructure. SkyBridge will create the infrastructure and technology to provide more than just traditional Internet access, a myriad of advanced services such as life-saving telemedicine applications, instantaneous, interactive access to the world of multimedia information for every child in every school in this Nation, an electronic commerce and similar services that will help not just big companies but small and home business improve the economic and social welfare of America.

I believe that as we venture forward into the Information Age, universal access to these types of services and not just access to simple telephony services will become the new definition of universal access.

Senators in conclusion, I hope I have helped you understand how low Earth orbit satellite systems can help provide Americans with choices of where to live, which providers to use, and which services and technologies to employ.

In the 1996 Act, this Congress took a bold step to hasten the deployment of advanced communications services such as the ones I have discussed for the benefit of all Americans. My company, SkyBridge, stands ready to fulfill this mandate and, given the proper regulatory environments, these satellite technologies will make it possible for every single American to gain a high speed on-ramp onto the information superhighway.

Thank you very much for your time.

[The prepared statement of Mr. Finkelstein follows:]

PREPARED STATEMENT OF DAVID FINKELSTEIN, SENIOR VICE PRESIDENT, MARKETING AND BUSINESS DEVELOPMENT, SKYBRIDGE LIMITED PARTNERSHIP

Thank you for granting me this opportunity to speak to you today. My name is David Finkelstein, and I am Senior Vice President of SkyBridge, which is a U.S. company proposing to bring interactive broadband telecommunications to the entire globe. SkyBridge plans to establish a network of 64 satellites in low-earth orbit to provide fiber optic-like connectivity to almost all areas on earth; we will provide Internet access, multimedia services, videoconferencing, and other advanced communications applications. SkyBridge has obtained financial and strategic backing from several major players in the satellite and communications industries, including Alcatel, Loral, Toshiba, Sharp and Mitsubishi.

But I am not really here to talk about SkyBridge. I am here to make you aware of the tremendous potential of the satellite technologies being pioneered by SkyBridge and several others in the satellite industry, including Teledesic and Celestri. As we usher in the new Millennium, these technologies promise to bring about a dramatic advance in the way we view the quality, availability and accessibility of broadband telecommunications infrastructure in the United States and around the world.

I would like to talk to you about how exciting new satellite technologies can provide three major benefits to Americans and to citizens of the world:

- First, the availability of broadband telecommunications to literally everyone;
- Second, the opportunity to create true competition and universal service in local telecommunications; and
- Third, increased services through efficient use of that scarce resource, radio frequency spectrum.

I. BROADBAND CAPACITY FOR ALL

I start with a simple, virtually unchallengeable proposition: access to telecommunications networks for the transmittal of voice and data communications has brought immense benefits to individuals and businesses. The enhancement of our day-to-day lives, and the enrichment of our social, economic and educational welfare, that have accompanied the recent growth in access to telecommunications services and the proliferation of global communications over the Internet and wide-area corporate networks, are facts to be celebrated by us all.

But even as we celebrate, we must be cognizant that not all is rosy in this picture. The truth of the matter is that our increased access to telecommunications infrastructure and bandwidth has occurred in a discriminatory manner. I am not just talking about economic discrimination between the haves and the have-nots. Certainly, this form of discrimination does exist, and is being addressed. What I am talking about is actually a more prevalent form of discrimination, one that threatens to render meaningless, for millions of Americans, programs such as Universal Service. I am speaking of geographic discrimination.

The terrestrial, wire-based telecommunications network that today serves as the backbone for the lion's share of voice and data communications in the United States either does not extend to numerous geographic areas, or serves those areas inadequately. The reasons why we have unserved and underserved areas in the U.S. and around the globe are complex, but basically come down to numbers. It costs substantially more money to pass a rural home with a telephone wire than it does to pass an urban home, and in some remote or mountainous regions the cost has sometimes proven prohibitive.

For this reason, the existing telecommunications infrastructure does not reach certain remote, less-populated or mountainous areas of this country. Local Internet service over these copper wires cannot be purchased in countless difficult-to-reach rural areas in the United States as easily and cheaply as it can be bought in New York City or Washington, DC. And advanced communications applications, such as tele-medicine services that can save lives, are simply not possible in numerous unserved areas around the nation.

Fortunately, basic telephone services are available to the vast majority of Americans—which is not the case for the rest of the world. But almost everywhere, the existing copper-based infrastructure cannot adequately support advanced broadband data communications, one of the fastest growing segments of the telecommunications industry. To be sure, massive improvements are being made to the existing terrestrial infrastructure, such as fiber optic networks, ISDN services and other digital upgrades, which are designed to improve the network for voice communications and to create the bandwidth necessary for the so-called information superhighway. Such improvements, however, have not yet made their way to many small busi-

nesses and residents, even in most major metropolitan areas, let alone to the rural or remote communities of our nation.

Given the current pace, cost, and difficulty of these expansions and improvements, the stark reality is that an acceptable grade and quantity of terrestrial, wire-based communications bandwidth may never be available to currently unserved regions—and in any event, certainly not on a widespread basis. Even in areas that now have some, but inadequate, access to the existing network, the expansion of the available terrestrial bandwidth to accommodate advanced data communications may take decades.

I believe America should ensure that every citizen, wherever he or she is, can have a high-speed on-ramp to the information superhighway, to take advantage of the shift from the Industrial Age to the new Information Age. Among other things, by moving in this direction, we will be ensuring that every citizen can choose where to live and where to work—without that choice depending on whether he or sho will have access to the information superhighway.

The fact that some people have a somewhat peculiar view of what "choice" is all about reminds me of the time, not too long ago, when I was driving through the great state of Texas. I drove by a roadside diner that had a big sign announcing "Texas BBQ + choice of vegetables: $9.95." I drove in, sat down and ordered my steak medium-rare. The waitress then told me that that day's vegetable was creamed corn. When I asked what was the choice, she replied "Do you want "em or not?"

Now that's not my idea of choice. America should aim to give every citizen a choice of service providers, wherever possible, because choice and diversity is what has made this country strong. Choice in this economy generally means competition (which, by the way, is why there have been some not-too-subtle complaints heard from current players about the arrival of these new satellite technologies); I would suggest, however, that choice is very much in the public interest.

I am here to talk about one solution to this problem that promises to bring about geographic nondiscrimination and to provide everyone with greater choice. Indeed, our company and others like it are risking billions of dollars in capital to realize this promise. The solution we are proposing is very near at hand and will make available to all Americans, in all parts of the country—in areas urban or remote, flat or mountainous, icy or arid—equal access to advanced communications service. This giant leap forward is being brought about by satellite technology, such as that being pioneered by my company.

While terrestrial networks discriminate geographically, the sky does not. A copper or fiber optic network has to be painstakingly and expensively installed along every route-mile, over or through every intervening mountain or valley, into every single home, business, school, library or hospital. But a constellation of satellites can provide the very same communications bandwidth to all rural, remote, mountainous, and sparsely populated areas that it provides to New York, San Francisco, and Chicago. Satellites can simultaneously and without much localized effort provide the same grade of service and capacity to Ethiopia, Peru, Siberia and Indonesia as they provide to Britain, Japan and Canada. This communications bandwidth can effortlessly extend to the tops of mountains, the bottom of valleys, the middle of deserts, the center of oceans, to the same extent that it is available in Times Square, Beverly Hills, and Monaco.

With such technology, a farmer in the Midwest will be able to sign up for lightening speed Internet service to enable him to check grain prices, identify potential buyers, sell his wares, and even read the New York Times, in the same way as a banker in New York will be able to sign up for Internet service to track stock prices for her portfolio.

A doctor in a remote town can have immediate access to communications infrastructure that will allow him to transmit x-rays and live video feeds of his sick patient during a teleconference with a team of specialists in Los Angeles, and can be guided in conducting a complex operation, as if the L.A. doctors were in the room peering right over his shoulders.

As another an example, small rural colleges would gain access to communications channels that will allow them to participate live in lectures being conducted at larger universities around the country. And teachers in local high schools in hard-to-reach areas will be able to disseminate assignments, reading materials, and interactive multimedia presentations to those students who cannot make the tough journey, and to other students during storms or other weather conditions that make traveling to school impossible.

This technology will also be available to all users—in all locations and with the same quality of service—from day one of a satellite system's operation. Once the satellites of a SkyBridge-type system are in orbit, they provide immediate global cov-

erage—and will provide services that are just as accessible in a remote area with one user, as in an urban metropolis with over a million users. Unlike a terrestrial system, in other words, we are not talking here of an incremental buildout over many years, but rather of "instant infrastructure" for everyone from the outset.

There are thus a vast range of benefits that global satellite technology will bring to all areas of this country and the rest of the world. And these benefits can be brought about without replacing the existing wire-based infrastructure. Indeed, SkyBridge and other similar systems can only work as an extension of the public telephone system. SkyBridge will be entirely dependent upon national and international fiber optic back-bone networks. These satellite systems will create access to the network for geographic areas not reached by it today, and simply provide "last-mile" connectivity to remote locations, thus preserving the huge financial investments that have already been made in existing terrestrial networks.

I truly believe that satellite technology promises to make the next century one in which the information superhighway can become more than just a concept or an ideal. Instead, it will be made into reality for the millions of Americans living in rural, high-cost, hard-to-reach, sparsely populated, and geographically unfriendly areas, all of whom will realize enormous economic, quality-of-life, and educational benefits from equal access to infrastructure for advanced communication. Rather than feeling pressured to migrate to the cities to participate in the information revolution, these citizens will suddenly have access to services unimaginable just a few years ago.

II. PROMOTION OF COMPETITION AND UNIVERSAL SERVICE

Not only will global satellite telecommunications technology improve the well-being of all citizens and increase the success of businesses; such technologies will also go a long way in fostering full-blown competition in the local and long distance telephone markets in the United States, and with respect to the U.S. portion of the Internet backbone. Such technology will also help bring about universal service, as dictated by the Telecommunications Act of 1996.

At the heart of the far-reaching '96 Act was the fundamental objective of promoting competitive telecommunications services in the United States. The '96 Act promised to usher in a world of competitive local and long-distance offerings, as well as universal service. Unfortunately, establishing competition has proven more difficult than expected in an industry where, in most geographic areas, one monopoly owns almost all of the wires going into the homes and businesses. The conventional wisdom these days appears to be that the '96 Act is failing.

But the Act need not fail. With respect to local competition, global satellite technology promises an ideal alternative to the traditional "last mile" of the local loop. By creating instant bandwidth that is easily accessible from any point on the globe, while still being connected to the public switched network, a satellite network can help to infuse competition by transmitting local voice and data communications from any home to the facilities of any local exchange carrier, incumbent or competitor alike. By breaking down the barrier to competition caused by the bottle-neck at the "last mile" of the local loop, satellite technology can help achieve the '96 Act's competition ideal.

Similarly, with regard to universal service, satellite technology is perhaps the most workable, soon-to-be-available way to turn universal service into a reality. Regardless of the amount of money contributed to the Universal Service Fund—and by whom—it is unlikely that these subsidies alone will make it feasible for carriers to provide the sorts of high speed, broadband services to certain remote, high-cost areas that are necessary for the residents of those areas to become full participants in the Information Age. A global satellite network can overcome inherent limitations of terrain and distance without additional infrastructure costs, thus making it possible to have service that is truly "universal."

III. A FINAL OBSERVATION—SPECTRUM EFFICIENCY

As the members of this Subcommittee know better than most, the radio-frequency spectrum is a resource limited by the laws of physics. It is this resource that enables satellite systems to bridge the gaps in the terrestrial infrastructure. Given the large number of different types of services and entities vying to use this resource—microwave, paging, cellular, DTH TV, you name it—it is necessary for the government to administer this asset in a manner that benefits all segments of the public. SkyBridge, in an effort to maximize the efficiency with which this scarce resource is used, has proposed an efficient and non-interfering protocol for sharing portions of the frequency spectrum already being used for other services. This proposal represents a forward-looking attempt by one company to use technological innovation

to provide global access to advanced informational services, while assuring full continuity of all existing services.

Government support for such technological advancements will help to take us full-speed into the 21st century, and will bring about an information superhighway with the potential for entrance and exit ramps into virtually every house, cottage, hut, igloo, tent, business, school, college, hospital, clinic, government office or other structure in the United States and on the rest of planet. This Congress has already recognized the great importance of advanced telecommunications technology for the creation of broadband communications infrastructure. In Section 706 of the Telecommunications Act of 1996, Congress directed the FCC to take steps during this year to "accelerate deployment" "to all Americans" of "high speed, switched, broadband telecommunications capability that enables users to originate and receive high quality voice, data, graphics, and video telecommunications using any technology." SkyBridge stands ready to help fulfill this mandate.

CONCLUSION

The changes taking place in the telecommunications industry are nothing short of breathtaking. Likewise, in an equally exciting but less visible way, the satellite industry is going through a radical transformation. Creating the best legal and regulatory environment to favor these simultaneous developments will not be easy. But satellite companies can and will make an enormous contribution to achieving the ideals of competition, universal service, and spectrum efficiency. We will create the expanded bandwidth, higher quality, readily and universally available communications channels being demanded by businesses and individuals. By using innovative satellite technologies such as that being developed by SkyBridge, our companies will provide instant global bandwidth for advanced communications, thus making the information superhighway accessible not just to major urban areas, but to all locations in all parts of this country and the rest of the world.

Senator BURNS. Thank you.

Now we have Mr. Erik Olbeter, director of advanced telecom and information technology programs here in Washington. Thank you for coming today.

STATEMENT OF ERIK R. OLBETER, DIRECTOR, ADVANCED TELECOM & INFORMATION TECHNOLOGY PROGRAM, ECONOMIC STRATEGY INSTITUTE

Mr. OLBETER. Thank you very much, Mr. Chairman. I would like to thank the committee for offering me the opportunity to speak before you. I would also like to commend the committee for holding a hearing on this subject.

This is a subject that the Economic Strategy Institute believes is vital to the future of the country, the economic future of the country. There has not been a lot of discussion of it in Washington, and I commend the committee for bringing us here today.

I would like briefly to make four points related to the broadband issue, and I will try not to repeat too much of what has already been said today.

My first point is that broadband networks are crucial to America's future economic grewth. At the Economic Strategy Institute we deal with a wide array of issues. We deal with interest rates, monetary policy, fiscal policy, communications policy. Of all those issues, the deployment of advanced broadband systems is clearly one of the most important drivers of this economy over the next 10 to 15 years.

Mr. Eisenach stole a bunch of my numbers from the Department of Commerce study, again, but I would like to take a step back and also say that taking action to spur broadband deployment is not just important for the IT community. Yes, the IT community is now

8.2 percent of the entire economy. It is also the fastest-growing segment of the economy.

But more importantly, these systems are a key to productivity through the entire economy, so that when you go to that steakhouse in Texas these networks can help that steakhouse become more efficient, provide lower cost services, sell lower cost corn or cream of corn, as well as helping large manufacturers become more efficient, more productive, and that is the key to our competitiveness, to our trade, to future economic grewth, and to a higher standard of living.

The other thing I would like to mention is that broadband networks are a tool for users, and I think it is important to remember the users in this. These systems will enable people in Montana, in New Jersey, wherever, to actually create applications, create new industries upon these systems. They are a tool upon which new industries can be created.

Right now, we talk about electronic commerce, telemedicine, distant learning, and the Commerce Department report said that they could account for over $300 billion in revenue in just a few years. But there are entire other industries that no one in this room, quite frankly, can imagine. It's the person in the garage, or the person in a living room, with these tools (access to the Internet and data networks at very high speeds) that is going to think of and create new industries. That is the real power of these systems.

The second point which actually Mr. Regan mentioned and I will just briefly go over, is that current investment in broadband networks is clearly lagging behind both current demand and predicted forecast demand. In particular, investment in the local exchange is not meeting the demand.

I would also like to make a point just in addition to what has been said today. The composition of that investment is almost exclusively business, not residential. Personally, I am not only worried about the rural markets, but I am worried about urban markets. There is a real fear out there in the market that although there are lots of companies wanting to get in there and provide the services, that they are not going to be able to efficiently, right now, given the current environment.

My third point is on that environment and, of course, we love to pigeon hole an exact cause, or exact particular regulation or market anomaly that is stopping firms from getting in there. But I think overall the lack of investment is caused at least in part by FCC rules and regulations that are holding back investment and clearly, I think what we have heard today is really three problems that the Economic Strategy Institute thinks the FCC must investigate in a section 706 proceeding.

The first one is, lack of enforcement of existing competition rules. Covad spoke very eloquently to this, and here is a company that is rolling out their networks, they want to serve customers both urban and residential, they are very determined, they have the funding for it, but simply, they cannot do it.

They cannot get access to the local exchange network in certain ways, and let me just enumerate, sort of repeat what he said, access to unbundled local loops at affordable prices, colocation problems, access to OSS systems.

The second problem is that there is in our view room for reviewing some new competition rules, particularly, sub local loop unbundling requirements. There are lots of competitors that are saying that if they can get in closer to the home, that they can provide services in great excess of what we are actually seeing now.

We think that those new entrants that have the technology, that have the will and have the financing, should be allowed to provide those services. We want to get them out there.

Third, is that many of the rules that have currently been written by the FCC have been written without regard to investment, and I think there is an entire—really a large number of these rules, particularly just very quickly, rate of return regulations, pricing regulations, cost and revenue accounting, earnings, new service introduction, service quality requirements. All of these rules have an impact on investments and need to be reviewed.

I would like to conclude with my fourth point, which is that ESI thinks it is absolutely essential that the Federal Communications Commission do something about this and initiate a 706 proceeding as soon as possible. We think there are three very simple guidelines that should guide them.

The first is that any proceeding must be carrier neutral. I do not think there should be any regard one way or another for incumbents or new entrants, but rather, the FCC should look at rules for both of those and determine the rules that are inhibiting investment in these broadband systems.

Second, I think it needs to be technology neutral, meaning that as Tim said, we should not be looking just at the telephone system, but what we should be trying to create is a multiplatform broadband environment so that satellite providers are providing broadband service. We should also be encouraging cable companies to do it.

We are looking at wireless providers, a number of them, personal communications services, wireless local loop, LMDS, MMDS, that all of these, if there are barriers to investment in these technologies, they should be removed, or if they need new rules that they should be written.

The third is that we need to realize that competition is going to drive investment, that this is really the key. We need to look and make rules and also look at rules with the interest of competition, that anything that we do to allow new entrants to foster investment is going to actually foster investment by incumbents. This is a primary driver of this revolution, and competition is the way that we are actually going to have a user-driven revolution that will allow everyone to participate in this market and create those new industries of the future.

Thank you. I would be glad to answer questions.

[The prepared statement of Mr. Olbeter follows:]

PREPARED STATEMENT OF ERIK R. OLBETER, DIRECTOR, ADVANCED TELECOM & INFORMATION TECHNOLOGY PROGRAM, ECONOMIC STRATEGY INSTITUTE

Good morning Mr. Chairman and Senators. My name is Erik Olbeter and I am Director of the Advanced Telecom and Information Technology Program at the Economic Strategy Institute. I would like to thank the Committee for the opportunity to speak today. I would also like to commend the Committee for addressing this crit-

ical issue, which, to this point, has been overlooked by most state and federal regulators.

The key points of my testimony are as follows:

1. Broadband networks are crucial to America's future economic growth. These networks will serve as the platform upon which a large and growing segment of the U.S. economy will do business in the future and upon which hundreds of thousands of workers will depend for their livelihood.

2. Current investment in broadband networks is lagging behind current and projected demand. Specifically, the local exchange lacks the technology to provide the next generation of broadband services and network applications.

3. The lack of investment is caused, in part, by FCC rules that hold back investment, or, sometimes, by lack of rules. Moreover, the FCC has not sufficiently enforced the pro-competition rules necessary to encourage significant new investment by entrants.

4. The FCC must take action to spur the deployment of broadband networks, and its actions should be guided by three simple principles. In order to ensure that Americans have access to broadband networks, any FCC action should be (a) carrier-neutral, (b) technology-neutral, and (c) pro-competition.

Broadband networks are crucial for America's future. Not only are broadband technologies preparing to reshape the telecom and IT industries, they also provide a burgeoning foundation for some of America's fastest-growing and most promising sectors. Few other infrastructures are as important to the long-term growth and prosperity of the United States, for example, as the Internet (including intranets and other electronic networks.) Not only is the sector itself growing at a blistering pace, the Internet is also fostering growth and productivity in existing industries, as well as entirely new industries. Consequently, growth and proliferation of broadband data networks have the potential to impact every sector of the American economy, from apple farming to semiconductor production.

This sector is also becoming an especially important part of the foundation for all communications and information technology (IT) industries. For example, computer, semiconductor, telephone service, and network equipment sales, are increasingly driven by the use and proliferation of the Internet. IT-dependent industries generated more than $938 billion in revenue in 1997. Each of them is growing far faster than the national GDP, and, in fact, they are driving economic growth. A recent Department of Commerce study estimates that IT industries will account for 8.2 percent of the entire economy this year, up from 6.4 percent in 1993. IT also accounted for almost half of economic growth in 1995, and ESI believes the majority of this contribution has been related to the development and use of data networks.

Data networks are also spurring entirely new industries that could be America's growth engines over the next twenty years. Three industries are particularly exciting: electronic commerce, telemedicine, and distance learning.

Observers from Main Street to Wall Street are starting to realize that the current spurt of economic growth brought about by the IT revolution will not last forever. The next future economic engine may well be networked applications, such as e-commerce, telemedicine, distance learning, and others that users may invent in their garages and basements. The real promise of broadband networks is not in physical plant and fiber-optic cables but, rather, in applications, and in the provision of a tool with which users can introduce innovations and products that satisfy market demand and create new industries unto themselves.

However, none of these industries will ever develop in a world where Americans must dial at slow speeds. Ubiquitous broadband networks are essential.

The problem is that, unless one is a large corporation or a very wealthy individual who can afford dedicated access, one can not get fast network connections, and the networks are not being built fast enough to meet the rising demand for broadband network connections. One company has forecast that demand for broadband networks will be more than 15 million households by the year 2003, but, at present, not even current demand is being met. Incumbent-local-exchange-company (ILEC) investment in modernization and maintenance is down for the last five years. Competitive local exchange companies (CLECs) have laid more than a half-million access lines, as of September 1997, but that pales in comparison to the more than 154 million access lines in America. While cable companies have experimented with broadband services, these trials have been limited to date. Terrestrial wireless carriers are currently investing heavily, through auctions, but broadband network rollout (third-generation cellular, LMDS, MMDS) appears to be years away, as is satellite service from companies such as Teledesic and Celestri.

Moreover, little of the investment being made today is focused on residential consumers.

So, if the demand exists, why are firms not investing?

The answer is not as simple as one might wish. At a recent ESI conference on broadband network deployment, representatives from every major segment of the telecom industry expressed their desire to deploy broadband networks, and I have submitted the transcript of that conference for the Commerce Committee's review. It was obvious at the conference that technological uncertainty and business fundamentals influence investment, but so does regulatory policy. More specifically, a lack of regulatory enforcement, as well as the influence of some existing rules, are deterring investment in broadband networks.

Speaker after speaker documented the regulation-generated problems that they face on a daily basis, illustrating how Commission rules impact incentives to innovate and invest in numerous and dynamic ways. These incentives affect both the level and the composition of investment in the telecom sector, as well as in the sectors that rely on telecommunications as their core delivery medium. In turn, the level/composition of investment in the telecom sector also impacts the value of investment and assets, as well as the incentives to invest, in closely related sectors that: (1) provide goods and services to the telecom sector, and (2) use telecom networks as complementary inputs. These sectors include producers of computers, computer components, software, online services, information services, data network, and telecommunications equipment and electronic commerce.

For a more detailed analysis of how the FCC's rules and regulations affect investment decisions, I have included a paper written by Dr. Larry Darby, an Adjunct Fellow at ESI, as supplemental material.

What, then, should the FCC do, or not do? The FCC should launch a Section 706 Notice of Inquiry as soon as possible. ESI's view is that Section 706 is the ideal vehicle for gaining a better view of how investment decisions have been skewed by Commission rules and regulations. The FCC knows the questions that need to be investigated. Most lobbyists will tell you they know the answers. However, as a community, we have not reached the point where enough research has been done to determine what rule changes are necessary.

In ESI's Comments before the Commission on Section 706 petitions introduced by Ameritech, Bell Atlantic, US West, and the Alliance for Public Technology, ESI has identified three principles that should guide the FCC's proceedings. These Comments are also being submitted for the Commerce Committee's review.

ESI believes that, if the three principles suggested in our Comments are adhered to, the FCC will be able expeditiously to identify and remove rules that inhibit investment, and to reinforce rules that promote competition and investment. This is based on ESI's belief that a country with multiple, competitive providers of broadband services will serve the public interest better than any single provider will.

PRINCIPLE ONE: A SECTION 706 PROCEEDING SHOULD BE CARRIER-NEUTRAL

Any FCC proceeding should examine the problems that all entrants and incumbents face in deploying broadband networks.

The petitions-to-date focus exclusively on promoting ILEC investment, disregarding investment by all existing and future players. The effect of these petitions would not be to optimize broadband investment, but to attempt to maximize ILEC broadband investment without regard for total or efficient investment. The time-honored name given to such a policy approach is "industrial policy," backed by a long history of government policies that designated a national champion in infrastructure. History and experience indicate that picking winners and losers in this fast moving industry would inevitably stifle innovation and lead to less investment.

The best example of this is Minitel. In the early 1980s, newspapers across the United States screamed that America was falling behind the French in information technology. The reason for their alarm was Minitel, the French data network connecting every home to a national network, built and controlled by France Telecom. The good thing about Minitel was its relative ubiquity. The bad news was that it locked the entire country into a single platform that was inflexible and indifferent to innovation. Innovations were introduced only when France Telecom wanted, not when users demanded them. As a result, France failed to produce significant software and data networking industries, even though they were the first country online.

Establishing rules that benefit one provider, or one set of suppliers of broadband networks, without regard for others, would be tantamount to establishing an American version of Minitel. The FCC should stick, instead, to the principle of being carrier-neutral.

PRINCIPLE TWO: A SECTION 706 PROCEEDING SHOULD BE TECHNOLOGY-NEUTRAL

This is another principle that everyone can probably agree to, but it has some rather significant implications for an FCC proceeding. Any proceeding should examine the state of investment, and the impact of rules on investment, in every sector having the ability or desire to offer these services.

This hearing today demonstrates that a broad range of players have an interest in this market: cable, telcos, satellite, electricity companies, cellular/PCS, and other wireless providers. It would be negligent not to examine the impact of Commission rules on each and every one of the potential market entrants. Failure to promote broadband investment by all interested parties could lead to a single platform (e.g., the telephone network) being the only real source of broadband network applications. For example, Commission action to promote telephone deployment of broadband network, without similar consideration for other platforms, could leave other potential providers at a competitive disadvantage.

The point that multiple platforms are better than any single platform is illustrated by Apple's introduction of the Macintosh. Prior to the Macintosh, computer users were locked into the IBM platform. To its credit, IBM did a pretty good job of handling the needs of most businesses, but the Macintosh launched entirely new industries. It provided the platform upon which a small company called Aldus, for example, could publish a little-known product called Pagemaker, and thus was born the desktop publishing business. Interestingly, Apple did not start the revolution that made its computers so popular but, rather, it simply provided a platform that allowed users to create their own applications.

Producing rules and regulations that promote multiple broadband platforms will allow users to create the e-commerce applications that spur tomorrow's efficiency, productivity, and jobs; so the FCC should adhere to the principle of being technology-neutral.

PRINCIPLE THREE: A SECTION 706 PROCEEDING SHOULD BE PRO-COMPETITION

It is often said that competition will spur investment. While competition policy may not always be enough to maximize investment. the old axiom still applies. Throughout the history of this industry, technological innovation, combined with competition, has spurred deployment of advanced systems.

For example, the two major shifts in AT&T's long-distance network occurred directly after the establishment of a competitive, more advanced system. In 1988, AT&T took the single largest write-off in history to upgrade its analog network to digital. The accounting write-off of almost $6.7 billion in long-distance network equipment, precipitated by Sprint's "Pin Drop," was not something AT&T would have done of its own accord. Today, AT&T again is rapidly revamping its long-distance network, in order to compete with newcomer Qwest, and others. This same pattern would emerge in the local market, if there were competition for information and Internet access.

Today, new competitors are attempting to enter the market and provide these services, but, for the foreseeable future, their ability to enter and compete on a level playing field will be dependent on government regulations (i.e. competition policy.) Broadband investment by new entrants in different sectors, whether CLECs, wireless providers, or satellite companies, will be a crucial part of the entire investment picture. As such, the enforcement of competitive entry rules needs to be taken very seriously.

Competitive investment is a key to innovation. The goal of Section 706 proceeding should not be to supplant competition policy with an investment policy but, rather, to ensure that current rules allow for the maximum amount of efficient investment.

To conclude, America has an important advantage in the deployment and development of critical broadband infrastructures, but, if the current regulatory regime is not altered to act as a promoter of broadband network investment, America may find itself following the lead of other countries in the future.

The FCC should take a serious look at the lack of investment occurring in broadband networks. Presently, there are far more questions than answers in the search for rules and regulations that promote investment. The Commission should initiate a proceeding in the next month to investigate these questions and to launch an official Notice of Proposed Rulemaking (NPRM) as expeditiously as possible.

Thank you for this opportunity to speak before you.

REGULATORY PERSPECTIVES ON INVESTMENT AND INNOVATION IN U.S. TELECOMMUNICATIONS

Dr. Larry F. Darby, Visiting Fellow—Economic Strategy Institute

April 22, 1998

INTRODUCTION

This paper reports some results of a broader review and analysis of the impact of regulation on investment and innovation in the telecommunications sector. It focuses on ways in which traditional and reformed common carrier regulation of telecommunications firms might influence the level and composition of their expenditures for new capital formation and their incentives to undertake risky innovation in a technologically dynamic and uncertain environment.[1]

We begin with a discussion of the historic importance of infrastructure development as a goal of telecommunications policy before turning to Congress' recent enlargement of that goal in the Telecommunications Act of 1996. We review briefly the tools available to the Federal Communications Commission (FCC or Commission) for encouraging infrastructure and innovation and what the theoretical and empirical literature has to say about the impact of various forms of regulation on innovation and capital formation. The paper concludes with some observations about the implications of our overview for development of a comprehensive and coherent policy to encourage innovation and investment in telecommunications infrastructure.

INFRASTRUCTURE GROWTH HAS LONG BEEN A TELECOMS POLICY GOAL

Making telecommunications policy is about making choices; choices among goals and choices among means. Telecommunications policy in the U.S. has gradually, but unmistakably, transformed both its goals and the means for achieving them.

For about four decades the aims of telecommunications policy for all practical purposes had a single dimension. In a remarkable display of consistency, the vast majority of rules and regulations put in place over that time period took into consideration "universal service" and was rationalized in part as a means of bringing it about. As a practical matter, the universal service goal was transformed into efforts to keep basic residential exchange rates low, despite the fact that lowering rates, and keeping them low, had at the margin only modest effects on the rate of household penetration.[2]

Rate structures were designed without regard to the true structure of underlying costs as a way to assure cheap access to and use of local exchange networks for local calling. Consistent with the goal of low basic exchange rates, imaginative cost accounting rules—long plant lives and slow depreciation rates, capitalization of station connection expenses, creative allocations of common costs among jurisdictions, services and users, for example—were adopted. Capital formation by regulated carriers was rationed and technology constrained through facilities authorization processes, but always directed toward assuring extension of basic local service to all households—rural and urban, rich and poor. Entry was foreclosed; earnings were constrained to assure investment sufficient to extend the network to all households; and, services were homogenized by regulatory fiat. (Remember the ubiquitous black telephone?) The entire regulatory apparatus was driven by the universal service goal—a goal named and supported by carriers in the old Bell System and their Independent Telco partners large and small.

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[1] This paper builds on and extends analyses in two earlier articles I have written jointly with Dr. Joseph Fuhr, Professor of Economics at Widener University. I am indebted to Dr. Fuhr for his contributions to this paper, a modified version of which will also be published in Issue No. 2, Volume six of the New Telecom Quarterly. See, Larry F. Darby and Joseph P. Fuhr, Jr., "Impacts of the 1996 Telecom Act on Investment and Innovation," New Telecom Quarterly, Second Quarter 1997, pp. 21–0; Larry F. Darby and Joseph P. Fuhr, Jr., "Telecommunications Capital Formation, Regulation, and Economic Development: A Primer", New Telecom Quarterly, Third Quarter 1994, pp. 45–2. I hasten to point out that we have not touched on matters related to incentives to invest and innovate in important and closely related sectors—wireless, satellite and cable systems. Their exclusion does not bespeak a judgment that they are unimportant, but a recognition of the limits of space here.

[2] The elasticity of demand for local exchange service is of course quite low. The coefficient has recently been estimated at = −.02 by Crandall and Waverman. It has been consistently found to be less that −.05. Robert W. Crandall and Leonard Waverman, Talk is Cheap, The Brookings Institution, Washington, DC, 1995, p. 92. This means that the demand for local service is insensitive to rates and implies, for example, that a doubling of rates (a one hundred percent increase) would suppress demand by only two percentage points.

Thus, for over forty years, rules and regulations of the FCC and their colleagues in fifty state capitals were focused on encouraging investment in infrastructure. To be sure, we did not call it that, even though it was clearly the goal of both the private and public principals to the common carrier, social contract. The goal served regulators' interest by giving them a major role in the management of telephone companies, while providing a metric—the level of basic exchange rates and the number of households connected to the network—the public could use to evaluate whether they were doing their job. The goal served the interests of the management and shareholders of regulated firms in several ways. Universal service (infrastructure investment policies) assured a large and growing capital stock (the rate base) from which growing and relatively secure cash flows could be generated in a market environment largely insulated by regulators from risks emanating from technological, market or regulatory sources.

The policy worked, but it had both unintended and undesired side effects that were magnified over time by technological change and the diversifying requirements of users.

COMPETITION INTRODUCED INTO THE POLICY MIX

After having practically accomplished the goal of building local infrastructure sufficient to achieve the goal of universal service, the Commission slowly shifted gears. In a series of controversial and widely opposed decisions beginning in late sixties and early seventies, the agency began to introduce other goals and another means into the policy mix.

The new goals were multidimensional and involved consideration of various types of economic efficiency, economic progress, productive process and service innovation, diversification of output, improvement of service quality and generally the vector of performance variables associated more generally with the operation of competitive markets. The goals were changed and enlarged.

A few critics expressed token concern with the neglect by regulators of efficiency and progress during the days of pursuit of universal service. However, except for a few disgruntled academic economists, the waste and inefficiencies associated with regulated and protected monopoly were accepted as the modest cost of the larger socioeconomic benefits attributable to pursuit and achievement of universal service.

In short, a reasonable, if simplified, characterization of the goals/means of telecommunications policy before 1996 would include an infrastructure or capital formation goal, called universal service; adoption of an "uneconomic" social rate structure as a means for achieving that goal; and, protection of monopoly and control of earnings as enabling devices. In contrast, in more recent years market rivalry and competition as a means of achieving goals not available under regulated monopoly have been the focus of public policy.

INVESTMENT AND INNOVATION IS A KEY GOAL OF THE NEW ACT

The Telecommunications Act of 1996 retained both competition and universal service as goals of policy, but added two new ones. More specifically, it added one—deregulation—and modified the infrastructure and investment admonitions embodied in the universal service goal so as to encourage investment and innovation in advanced, digital, broadband telecommunications facilities. But, by expanding the number of goals, without changing available policy instruments, the Congress laid the groundwork for confusion, delay and uncertainty.

Though most of the day-to-day focus of telecommunications regulation at the FCC, in the States and in the Courts, since the Act was passed over two years ago has been on matters related to removing barriers and otherwise promoting competition, rationalizing rate structures and ensuring the preservation and extension of universal service, the Act expects and commands more, much more, for its successful implementation. Notwithstanding the narrow regulatory focus to date, much of the promise of the Act, reflected in the debate preceding its passage and the publicity and rhetoric thereafter, relates to capital formation and innovation in telecommunications network systems—a sentiment that is captured in political statements and in the popular press by terms like "information superhighways", the "National Information Infrastructure", the "Networked Nation" and others.

The Act contains several references to investment and innovation. But, the keystone in this respect is contained in Section 706. It charges the FCC with:

> . . . encouraging the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans by utilizing, in a manner consistent with the public interest convenience and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local

telecommunications market, or other regulating methods that remove barriers to infrastructure investment."[3]

The debate preceding the Act's passage was marked by clear expressions of Congressional intention to stimulate investment and innovation, as is suggested by the following language:

The goal is to accelerate deployment of an advanced capability that will enable subscribers in all parts of the United States to send and receive information in all its forms . . . over a high-speed switched, interactive, broadband transmission capability.[4]

President Clinton on signing the new bill into Law observed that his administration had promoted the bill as a means, among other things, of stimulating investment and providing access to the "Information Superhighway", a term, whose popularity has been in considerable measure the result of several speeches by Vice-President Gore.

Thus, there is wide recognition and support among the country's political leadership for a telecommunications policy that promotes investment and establishes a regulatory and market environment which encourages risk taking and innovation. Lamentably, much less clear is the extent to which the FCC and state regulatory agencies have been responsive to the call for putting in place a coherent set of policies clearly designed to foster innovation and investment.[5]

THERE ARE DIFFERENT THEORIES OF INVESTMENT AND INNOVATION

Given the Commission's statutory obligation to encourage "deployment . . . of advanced telecommunications capability . . .", it is reasonable to ask how it might, or should, do so.

The deployment of advanced telecommunications capability requires both investment and innovation from the private sector. A reasonable starting point is to explore the determinants of the level and composition of investment in the telecommunications sector and, relatedly, what determines the rate and direction of innovation. While frequently treated as synonymous, and are clearly related, these are two very different questions.[6]

The literature on the influences and causes of investment and innovation is too broad and diverse to summarize here. Indeed, even the reviews of the literature are voluminous. The following simplifies without further apology.

Investment determinants. Explanations of the cause of investment are difficult to summarize and even more difficult to comprehend in their full breadth and depth. Dozens of theoretical investment models have been devised and many more have been tested. But, neither theoretical investment models nor empirical explanations have won much consensus, never mind universal acclaim.

An eminent academic investment analyst, Harvard economist Dale Jorgenson, wrote some years ago:

"There is no greater gap between economic theory and econometric practice than that which characterizes the literature on business investment in fixed capital."[7]

While the gap has been closed somewhat in recent years, due to the efforts of Jorgenson and others, it is still true that a bewildering array of forces have important and differential effects—depending on circumstances—on the rate and composition of investment.

Earnings matter, but are not dispositive. So do interest rates, risk and prospects for growth. Capital budgeting models built on these variables are instructive, but

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[3] Codified at 47 USC Section 157 note ("Section 706")

[4] Senate. Report 104–3, 104th Congress., 1st Session 50 (1995), p. 51

[5] The Act sets forth in no uncertain terms in Section 706 (b) a requirement that, within thirty months after the Act is enacted, the FCC shall . . . . "initiate a notice of inquiry concerning the availability of advanced telecommunications capability to all Americans . . . and shall complete the inquiry after 180 days." Nevertheless, there has been no action on this impertant Congressional directive and there is little indication, beyond passing reference in the Commission's self-styled Trilogy (three proceedings addressing interconnection, universal service and access charge reform) and rhetorical flourishes in speeches, that the Commission is concerned about this critical issue.

[6] Of the numerous definitions of innovation, our favorite was set out many years ago by Professor Jacob Schmookler who spoke of it as follows: "When an enterprise produces a new good or service or uses a method or input that is new to it, it makes a technical change. The first enterprise to make a given technical change is an innovator. Its action is the innovation." Jacob Schmookler, Invention and Economic Growth, Cambridge, MA, Harvard University Press, 1966, p. 8. Investment, of course, refers to acquisition and installation of capital goods, an activity that may or not be innovative, depending on whether the investment is for simple replacement or extension, or for modernization and adaptation of new production technologies.

[7] Dale W. Jorgenson, Investment: Capital Theory and Investment Behavior, The MIT Press, Cambridge, 1994, p. 1.

standing alone do not have reliable predictive power, for it seems that other variables—cost of capital goods, market structure, general business conditions and outlooks, marginal capital to output ratios, durability and replacement cycles, the rate of change of demand, the state of technology, to name a few from a survey of the models—are often dominant. In the world of investment models, everything seems to depend on everything else.

This complexity in investment models and explanation makes clear that it will be nigh impossible for federal and state regulators to find specific, unambiguous and incontestable support in the investment literature for any particular approach. The situation is further complicated by the obvious fact that many of the variables important to investment are beyond the control of any regulatory agency—interest rates, health of the economy, expectations about future conditions, growth and composition of future demand, supply of complementary goods and services, costs and quality of capital goods, to name a few.

Does this mean there is no guidance for the FCC in the investment literature? No, not at all. There is no disputing that risk and uncertainty—of the kind regulators either create or can control—are deterrents to investment. It is indisputable that efforts to divide the market among competitors, or to handicap, or favor, particular groups will be recognized by managers and financial investors alike. The literature, including the writings of telecommunications securities analysts, makes clear that regulation matters. Rules influence outcomes and payoffs and thereby influence investment incentives. Regulatory indifference and lack of appreciation of the enormous impact of regulatory decisions on the incentives to invest of profits maximizing, shareholder value sensitive managements (for entrants and incumbents alike) may be the biggest barrier of all.

The complexity of investment determinants does imply that considerably more analysis of the structure of specific market opportunities and constraints in the telecommunications sector must be undertaken before we can even begin to surmise about how the Commission can use its limited policy tool kit to encourage investment in the sector.

Innovation Determinants. We have found no good theory of innovation. No surprise here. The very neoclassical microeconomics that has developed such powerful and policy robust theorems about decision making within firms and the operation of markets does not help us to understand with any certainty or specificity what "causes" firms to innovate and how telecommunications policy might be applied to assist in the process. But, that does not mean that policy does not matter.

Much of what we regard as innovation and technical advance is purely serendipitous. Numerous key innovations—penicillin, cellophane, current electricity, vulcanized rubber, X-rays, radioactivity, practical photography, fire and the wheel come to mind—were not the result of purposeful activity, subject to pace and direction.[8]

Several theories have been developed and tested, but the findings are not especially robust and are almost always expressed in tentative terms. We are informed by one scholar that: "The astonishing diversity of the processes and phenomena associate with innovation suggest that the idea of a unified theory to explain it may be a pipedream."[9]

While innovation studies are not without policy implications, they do not generally yield specific and clear cut policy guidance—particularly in a sector as complex and dynamic as markets for telecommunications.

A recent comprehensive review of innovation concluded;[10]

1. Innovation is costly.
2. Innovation involves significant sunk costs.
3. Innovation influences costs and revenues in widely varying ways.
4. Firms vary widely, but not predictably, in their "innovativeness".
5. Knowledge is cumulative; success breeds success.
6. "Spill-over" effects undermine "first mover" advantages
7. Feedbacks among market conditions, innovation strategies and performance shape industry evolution.
8. Innovation may be a means to create barriers to entry and thereby diminish price competition.
9. Employment impacts of innovation are ambiguous.
10. Innovation is the ultimate force for reshaping economic structures of all kinds.

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[8] Morton I. Kamien and Nancy L. Schwartz, Market Structure and Innovation, Cambridge University Press, Cambridge, 1985, p. 1.

[9] Peter Hall, Innovation, Economics and Evolution; Theoretical Perspectives on Changing Technology in Economic Systems; Harvester Wheatsheaf, New York, 1994, p. 403.

[10] Ibid, pp. 407–10

While these related findings from the literature are indispensible to informing and providing a foundation for regulatory policies, they do no provide much in the way of specific guidance. Regulators need more than this, however. More detail and specificity are required. The relationships between innovation and market structure; between innovation and firm size; between innovation and the degree of competition; and, between innovation and a host of other structural conditions are simply not known with sufficient precision to support a broadscale regulatory effort to encourage innovation.[11]

We need to know more; much more, about key linkages. But, first we must ask the right questions, insist on reliable analytical approaches and make certain that the relevant data for testing and measuring various hypotheses and outcomes are available. Our regulators, to date, have not done any of these.

REGULATORY COMMISSIONS HAVE SEVERAL VERY POWERFUL POLICY TOOLS

Regulatory agencies exercise broad and deep powers over the conduct of carrier businesses. They can dictate organizational structures. They prescribe the means of cost and revenue accounting; the types of services that may or may not be offered, and under what conditions. They control the structure of rates and exert substantial influence over the overall level of revenue. Agencies have the ability to impose costly service requirements, including carrier of last resort obligations; they may prescribe the terms and conditions of service to end users and, very importantly, to competitors; they may and do prescribe the content of marketing materials and communications with customers. They charge for radio licenses and impose a variety of other hidden, but no less substantial costs, on companies under their purviews.

These and numerous other expressions of regulatory control over business operations influence the payoffs—costs and benefits—from investing and innovating and thereby substantially shape the incentives for private firms to do so. That we are unable to determine specific and quantifiable one-to-one relations between government rules and private market behavior does not negate the power of the influence.

The Telecommunications Act in Section 706 sets forth some suggestions for tools the Commission might use:

> ". . . price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment."

While the Commission is not limited to these tools, they are so broad as to be virtually all encompassing of the Commission's options.

We want to emphasize that promoting market rivalry is an important tool for stimulating investment and may be an important impetus to innovation as well. Nevertheless, competition policy alone is not sufficient to ensure high levels or an acceptable composition of either. Moreover, given that there are countless specific manifestations of "competition policy", it follows that there is no assurance that the complex vector of federal and state rules constituting current "competition policy" will in fact stimulate total investment (entrant plus incumbent) in the sector, or that the investment that is stimulated will in fact be "efficient" investment consistent with the requirement that traffic be awarded by users to the low cost carrier. Competition is no doubt necessary to ensure the public interest, but the Commission's competition policies—embodied in the orders issued to date—are by no means sufficient to meet the requirements of Section 706 or the needs of the economy for high levels of both investment and innovation in this sector.

STUDIES OF REGULATORY LINKS TO INVESTMENT/INNOVATION INCONCLUSIVE

We have reviewed the available literature on the relationships between various forms of regulation and firm/industry performance as it relates to investment and innovation. The preceding discussion suggests the difficulty of establishing empirically clearcut bridges linking government constraints on market structure and market behavior on the one hand and "dynamic" firm or industry performance on the other.

There are countless ways in which regulations might influence investment and innovation through their impact, for example, on the neoclassical determinants of investment—expected earnings or cash flow, risk and growth expectations—and more

[11] The gap in our knowledge about different characteristics of markets and the prospects for innovation is succinctly summarized in the conclusion of a recent review of the literature. The authors conclude: "Another gap in the empirical literature is the absence of a satisfactory explanation for interfirm differences in innovative activity." See, Wesley M. Cohen and Richard Levin, "Empirical Studies of Innovation and Market Structure" in Handbook of Industrial Organization, vol. 1, Richard Schmalansee and Robert Willig, eds., North Holland, 1992, p. 1097.

specific incentives that operate through these. Regulations and regulatory processes influence private sector expectations about the present value of potential capital formation programs. As such, they hold enormous sway over investment incentives.

Much of the literature on incentive regulation focuses on modifications to the form of the rate of return constraint—the limitation on earnings. Traditionally, earnings of telecommunications common carriers have been determined by the classical method of setting allowed earnings as a function of the used and useful rate base—capital stock—times a fair rate of return (based on the weighted average cost of capital).

Several variations on this basic monopoly earnings control scheme have been tried. The most common variations can be grouped in three categories: rate change moratoria or freezes, "profit" sharing, and "price caps". Under a pure rate moratorium, firms agree to freeze rates for a specific time period in exchange for eased restrictions on earnings. This gives firms the incentive to become more efficient, since the cost savings can be realized by shareholders. Consumers gain because nominal rates are constant and declining in real terms. The profit sharing plan allows for the firm and the consumer to divide profits earned by the firm in excess of the baseline "allowed" rate. In principle, this opportunity will also induce the regulated firm to be more efficient by permitting it to flow realized cost efficiencies to shareholders, while consumers gain in proportion to their share of the reduced costs that would not otherwise have materialized. Pure price cap regulatory schemes have similar salutary incentive effects, in principle, since they too permit carrier management to pass cost savings to owners, instead of being obliged to return them to consumers.

Other plans mix the basic features of these. But, all are designed to give the firm positive economic incentives to behave in ways they would not under traditional rate-base, rate of return earnings regulation. But, as they say, "The devil is in the details." Thus to understand the incentives of the firm to invest more or to become more innovative under these plans, it is necessary to understand the plans' specific construction and the incentives embodied therein.

Efforts to measure the impact of these incentive plans addressing carrier earnings prospects have found generally positive impacts. However, existing empirical work does not support a conclusion that incentive regulation plans have produced dramatic changes in key performance indices across the board in the telecommunications industry. In general, the studies indicate improvements in productivity, quality of infrastructure, level of investment, returns to shareholders, telephone penetration and the rate of introduction of new services offerings. Prices have been stable or decreasing and quality of service has not decreased.[12] But, the effects are seldom dramatic and almost always contestable, owing to either flaws in study design, inadequate specification of the models, ambiguous data or other difficulties that plague efforts to measure regulatory impacts.

A handful of studies have addressed specifically the impact of earnings-based incentive plans on capital formation.[13] The most comprehensive and rigorous study made to date concludes that incentive regulation,especially price regulation increases infrastructure investment and innovation.[14] This study examined the propensity of local carriers to invest in "innovative" technologies under different regulatory schemes and concluded that direct regulation of prices substantially (as much one hundred percent) increases the rate of deployment of Signalling System 7, fiber links and ISDN technologies.

An earlier and related study examined the relationship between network modernization and incentive regulation (related to both earnings and pricing flexibility) using industry-wide data for local exchange companies and concluded that infrastructure deployment employment is substantially enhanced by incentive regulation.[15] A follow up study indicated that profit incentives alone in the incentive plans—without other pricing incentives—did not significantly influence the propen-

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[12] See Denald J. Kridel, David M. Sappington and Dennis L. Weisman, "The Effects of Incentive Regulation in the Telecommunications Industry: A Survey", Journal of Regulatory Economics, vol. 9, No. 3, 1996, p. 271.

[13] These and related studies are addressed in an excellent review by David M. Sappington and Dennis L. Weisman, Designing Incentive Regulation for the Telecommunication Industry, The MIT Press, Cambridge MA, 1996, pp. 314–24.

[14] Greenstein, Susan McMaster and Pablo Spiller, The Effect of Incentive Regulation on Local Exchange Companies' Deployment of Digital Infrastructure, Journal of Economics and Management Strategies, vol. 4, 1995, pp. 187–36.

[15] William E. Taylor, Charles J Zarkadas and J. Deuglas Zona, "Incentive Regulation and the Diffusion of New Technology in Telecommunications, Paper Presented at the Ninth International Conference of the International Telecommunications Society. (mimeo; June 14–7, 1992)

sity of regulated carriers to invest. Finally, we are obliged to report that one study concluded that incentive plans have no impact on infrastructure investment.[16]

Most attempts to measure the effect of incentive regulation have have found positive impacts on investment of regulatory efforts to reform traditional rate of return regulation. Despite serious problems of identification and measurement problems the principal studies are united in that conclusion.

More specific linkages between regulatory rules and incentive effects on the conduct and performance of firms are very difficult to identify. For example, if the firm's performance in one time period affects its future regulatory environment, the effects are not at all clear cut. The basic theory of incentive regulation of earnings is that higher earnings will bring about beneficial firm conduct. However, regulators come under substantial political pressure to renege on the original arrangement and to "recontract" when firms report high profits.[17] Thus, in determining resource allocation in the near term, firm's under these kinds of incentive regulation must take into account how committed the regulatory authorities are to the agreed upon incentive regulation and also, the probability that present earnings will adversely effect the future type of regulation. This not only adds uncertainty and thus risk to the firm but makes it more difficult to achieve either a market solution or a predictable one. The uncertainty invites gaming.[18]

REGULATORY POLICIES TO ENCOURAGE INVESTMENT AND INNOVATION?

There are no silver bullets. It will not be simple or noncontroversial to identify and implement policies that will meet the requirements of the economy for high speed digital electronic distribution systems. Such policies will have to be woven into a web of existing rules and regulations motivated by entirely different concerns and over a long period of time.

A major challenge, and one that must be met if we are to succeed, will be to overcome the traditional mindset that basically takes technology, technological change and investment in this sector for granted. It is too important to take for granted.

Technological change and innovation are indispensable to the economy at large and no less so to telecommunications and the larger information technology sector of which it is a part. Forty years ago Nobel Laureate Robert M. Solow published research indicating that about 80 percent of the increase in gross output per worker hour in the US in the first half of the twentieth century was attributable to technological change. While subsequent work has lowerod the estimate somewhat, they leave unchanged the force of Solow's work—technological change is the primary force propelling growth in productivity and our standard of living. The authors of an important review of markets and innovation summed it admirably:

> . . . whether technical advance is regarded as a blessing or an evil, we cannot ignore it. Indeed, it is arguably the most important determinant of our past present and future.[19]

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[16] William Page Montgomery, "Promise versus Reality: Telecommunications Infrastructure, LEC Investment and Regulatory Reforms", Research Paper, MCI Communications Corp. (August 1994). We report this result despite our lack of confidence in the method or the findings. The independent variable used, investment per access line, is widely known to be an exceptionally ambiguous and unreliable measure of the impact of regulation on capital formation. This study suggests that incentive regulation leads to less investment and, as such, proves rather too much.

[17] Z. Starkey and John W. Van Pelt, Jr., "Productivity Measurement and Price Cap Regulation", Telecommunications Policy, vol. 19, no. 2, p. 157.

[18] Dennis Weisman, "Superior Regulatory Regimes in Theory and Practice," Journal of Regulatory Economics, vol. 5, 1993, p. 363. Weisman contents that the firm under modified price caps has the incentive to engage in pure waste if it gains more from roducing the probability of recontracting than it loses from engaging in pure waste. Thomas P. Lyon, "Regulatory Hindsight Review and Innovation by Electric Utilities," Journal of Regulatory Economics, vol. 7, 1995, p. 249. Lyon claims that if the firm's share of profit is low then it may overcapitalize so that in the future when its profit share may be higher or it is deregulated then it already has built its plant and its profits will increase. Michael A. Crew and Paul R. Kleindorfer, "Incentive Regulation in the United Kingdom and the United States: Some Lessons", Journal of Regulatory Economics, vol. 9, p. 214. Crew and Kleindorfer argue that pure price cap scheme mimics a competitive market in that the firm can keep all its earnings. However, if a firm thinks that it's success will be penalized, then it will game the system and pursue "optimal" efficiency based on forecasts of future regulatory change. Others note an unintended negative effect of all these incentive plans if they lead to "too much" efficiency that deters future entry and thereby reduces competitive forces downstream. Thus, some have argued that "efficiency-based" entry barriers may have an the deleterious effect of sheltering an incumbent from future competition. Sanford V. Berg and R. Dean Foreman, "Incentive Regulation and Telco Performance: A Primer", Telecommunications Policy, vol. 20, no. 9, p. 651. Berg and Foreman purport that erecting barriers to entry dampens incentives to innovate and to discover new ways to meet consumer demand.

[19] Kamien and Schwartz, p. 223

Much of the mindset of the regulatory community seems to be focused on matters involving fair competition and fair interconnection and access by favored groups to services and to the essentially impossible task of "getting prices right". The focus is on fairness and short run static efficiency. But, that focus may well be myopic, and we think it is. A recent review of antitrust policy contained what we regard as an efficient expression of the current gap in regulatory performance:

We know that many discussions of antitrust policy and efficiency have violated the New Testament injunction against beholding the mote and ignoring the beam. X-efficiency is much more important than allocative efficiency and dynamic efficiency is almost surely even more important.[20]

Dynamic efficiency is critical; even more so than more conventional static measures, if Scherer is right. Kamien and Schwartz expressed the same sentiment:

Thus, technical advance appears to require the sacrifice of some allocative efficiency at each moment of time for the purpose of greater efficiency in the long run.[21]

Short run static efficiency is important, as are efforts by regulators to achieve it. But, the longer run performance of the economy depends on investment and innovation—activities that are not necessarily, or even probably, optimized by single-minded pursuit of policies to ensure equity and fairness and arbitrary costing and pricing standards—especially if those are pursued, as they have been, without regard to dynamic considerations.

How can regulatory institutions best contribute to "dynamic" efficiency? Again, there are no silver bullets; no simple one-shot solutions.

The key is probably found in the complex regulatory behavior that resulted in the successful pursuit of universal service. In retrospect, universal service policy considerations permeated almost every rulemaking for several decades. Asimilar preoccupation with and commitment to investment and innovation will be required by the regulatory community.

Recognition by the regulatory community of the enormous contribution of telecommunications investment and innovation to our overall economic welfare is a necessary first step. Infrastructure policy is just as important as competition policy to the public weal. A good second step is a recognition by regulators of their role in fostering, or discouraging, investment and innovation. A third is a commitment to making the impact on infrastructure a consideration in all regulatory determinations. Call it "Universal Service" for the twenty-first century and the digital age.

Senator BURNS. Thank you.

Mr. Daggatt, in satellites, whenever you interchange with the local carrier—I would imagine you would be just like the long distance wire companies, is that correct?

Mr. DAGGATT. That is right, Senator.

Senator BURNS. And you will offer voice along with data?

Mr. DAGGATT. Yes. I think by the time we are in service in 2002 that the distinction between voice and data will be largely meaningless. By that time, the number of data bits, the amount of data bits moving over the networks are going to simply overwhelm the voice bits, and ultimately the Internet protocol will prevail over the circuit-based networks, and so yes, voice will be inherently a part of data service at that point.

Senator BURNS. Some proposals that are floating around Capitol Hill now, we will be having hearings on, is the basic deregulation of the satellite industry. In other words, moving the quasi organizations into the private sector as nearly as we can. Does that affect you?

Mr. DAGGATT. It does, and we at Teledesic appreciate the attempts by Congress to take on the whole set of issues entailed in that, which in some ways are similar to the issues involved in terrestrial networks in that you have in this case the legacy of inter-

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[20] F.M. Scherer, "Antitrust, Efficiency and Progress", New York University Law Review, vol. 62, November 1987, p. 1018.

[21] Kamien and Schwartz, p. 217

governmental organizations that need to be dealt with as we transition to a marketplace dominated by commercial proprietors.

Senator BURNS. I was interested in the figure that came out from the Commerce Department the other day, too. I was very interested. If we forecast anything during the debate of the 1996 Act we said there will be, once this happens, an explosion of opportunities, and therefore investments, and it will create an economic engine that will be very noticeable, and I think we have seen that happen in this country.

I was also interested in the access that you promote to the universal service. Have you taken any kind of a position on your participation or paying into the universal service if you offer voice capabilities?

Mr. DAGGATT. Teledesic, as I indicated in my remarks, is part of the solution, rather than part of the problem. Because the technology will allow the provision of these advanced services to any part of the country at a cost independent of location, the idea of, in effect, taxing that service to provide universal service is sort of counterproductive or almost paradoxical. It is technologies like Teledesic that, over the long term, will eliminate the need for things like universal service funds.

But certainly to inhibit the deployment of a technology like Teledesic in the name of universal access would be counterproductive.

Senator BURNS. Senator Rockefeller.

Senator ROCKEFELLER. I was just going to discuss with Barbara, prior to the statement that you just made, you are going to eliminate the need for universal service funding. And that is the point of my series of questions here.

Mr. Eisenach, I like you for many reasons, but you are the only man I have ever met who bears the name of the birthplace of Johann Sebastian Bach, so that starts you out with a very high order. You diminished your stature somewhat when you pointed out that 45 percent of the growth in the economy, or however it was phrased, is due to growth in telecommunications. It is enormously exciting, enormously important and potentially enormously irrelevant to the Telecommunications Act of 1996 and its fundamental purpose, which is that all Americans shall be equally served.

In other words, it is a little bit like saying that I am very happy to report to you that my income, which has never been stretched terribly thin in the first place, was enhanced because of the direct actions of Senator Burns and some of his colleagues to reduce my tax burden. Now, I can look upon that as saying that this is a terrific thing or I can say, yes, it is a terrific thing for me, therefore—i.e., read, the industry—but that does not necessarily relate it in terms of fairness, universality, to the rest of American's progressivity and the rest and all of that.

And that point I want to just keep hammering at and hammering at and hammering at. You say, Mr. Daggatt, that this will end our need for universal service funding. The Act, which helped to cause this 45 percent explosion—which is good—which is very, very good—it says several things. It says that the Commission shall—interestingly, it does not say "may," it says "shall"—encour-

age the development, on a reasonable and timely basis, et cetera, et cetera, by—then they use that awful word "utilizing"—it should be "using"—in a manner consistent with the public interest, with the public convenience, necessity, price cap regulation, regulatory forbearance—which means they shift, they modulate, they nuance, in order to encourage, to make sure that the public interest is served—measures that promote competition in the local telecommunications market, et cetera.

They go on, in another section, Section 254, and they say: Any other provider—which is sort of today's discussion—any other provider of interstate telecommunications may—they do not say "shall," they say "may"—this is where the FCC, which is a very distinguished group of very fine individuals—may be required to contribute to the preservation and advancement of Universal Service if the public interest so requires.

Now, what I want you to explain to me is—my fear is that as we get away from what we were thinking about in 1996—and yes, I work for the Government, and I come from a family that did not think very much of the government—but my obligations are very clear to me in terms of the people I represent and the country I represent in the position that I have. So Universal Service is sacred with me. It is absolutely sacred.

When you talk about making all of that money, I have to be careful to control myself, to say, good, that means that supplying money for Universal Service, to allow things like schools and libraries and rural health centers to do telemedicine, which has been mentioned here by the previous panel, is financially possible.

Now, the point I want to ask you all is do you think that you—not, I think, you, Tim, but the rest of you—do you think that you have an obligation, talking about higher orbiting satellite systems, lower orbiting satellite systems, which bypass the whole presently defined telecommunications system—and neither of them are in operation, so it is prospective—do you think that that fits within the law, any other provide of interstate telecommunications? And if it does, then why would you not be required to support the Universal Service Fund?

Mr. FINKELSTEIN. Could I take a shot at answering that question?

Senator ROCKEFELLER. Of course.

Mr. FINKELSTEIN. You used a word, "bypass," and I think that is probably a substantial concern here. There are technologies which allow to avoid bypass. The SkyBridge system is designed in order to be a simple extension of existing terrestrial networks. And therefore, by always transitting through gateways, which are under the control of the terrestrial carriers and that are regulated by the structures that this Congress has put into place, we will be able to ensure that there is a uniform application of the same rules, so that everybody has a level playing field and competition is fair.

And therefore, through those gateways, there will be a monitoring and insurance that where contribution to the Universal Service Fund is required, it will be channeled through those gateways.

Senator ROCKEFELLER. Through those gateways?

Mr. FINKELSTEIN. Which are an integral part of the SkyBridge system.

Senator ROCKEFELLER. All right. You were, in a sense, very idealistic—and I like that—in your remarks.

Mr. FINKELSTEIN. Thank you.

Senator ROCKEFELLER. Because you were very clear and forthright on that issue. But, on the other hand, you may be talking about a suborbital to what Mr. Daggatt was talking about, but it is basically the same system. I mean at what height the satellites fly, I know not. But Mr. Daggatt said, I think, that he did not believe that paying into the Universal Service Fund was going to be necessary. And I would like to know why.

Mr. DAGGATT. Yes, Senator Rockefeller, let me elaborate a little bit. My point was not necessarily that systems like Teledesic would eliminate the need for a universal service fund, but certainly these kinds of technologies mitigate the need for that over time, because they provide a service with a cost independent of location. The problem with wireline technologies is that it costs a lot more to serve people in rural areas than it does to serve customers in more concentrated urban areas.

It is that imbalance in cost, in particular, that requires a need for subsidy to ensure universal service. But if you have a technology that can provide the service to the rural areas at the same cost or, in a sense perhaps, even a lower cost, because of the supply and-demand equation that you have got a lot of capacity sitting out over areas with very little demand, that that directly addresses the problem that the Universal Service Fund is intended to address, which is the imbalance in cost.

So if you can provide it at the same or lower cost to rural areas, again, it directly addresses, through competitive market forces, the issue that the Universal Service Fund attempts to address indirectly through a rebalancing of funds.

Senator ROCKEFELLER. I understand your point precisely. And then I would simply come back to say—and you say it well—that you would insist, then, that in this prospective system that you are talking about, not yet arrived, not yet demonstrated, not yet audited in the public interest, so to speak, that it be able to provide, for example, not just universal service—Ted Stevens' high-cost requirements in Alaska—that you be able to meet that through a different approach, but that also that the wiring up of schools and of libraries and rural health centers, et cetera, that all of that would be fully met, fully enabled, fully empowered by the technology which you specifically are talking about. And if that were not shown to be able to be in full effect, then you would admit that paying into a universal service fund, which would put those things into universal effect, would be appropriate?

Mr. DAGGATT. Absolutely. In fact, I could even go one step further and say that if a carrier commits to providing the identical quality of service, the identical capacity at the identical price to anyplace, absolutely anyplace, geographically in the country, that then they could be exempted from that requirement.

Senator ROCKEFELLER. That interests me very much, Mr. Chairman, and I will leave it there for the moment. This also has nothing to do with anything in particular, but it was interesting. The

FCC, I thought, took a very interesting and very important action yesterday on slamming, which you gentlemen do not do. And I thought it was quite remarkable, when this poor gentlemen, who was hit with a $5.6 million or $6.5 million fine, has been unknown, unseen, unavailable for the last 2 years. He has been hit with a fine nobody can service him with, because he has caused hundreds and hundreds of thousands of people to come into his long distance service without telling them so, by talking about—and, again, all I mean by that is that so much of what we are doing in telecommunications, so much of this explosion—45 percent explosion—so much of it is out there, it is possible, it is doable, it is feasible, there are young and exciting faces before us in the testimony. But it has not happened yet. It has not yet happened yet.

And until the universality test is met, do not we have an obligation, as protectors of the public interest, along with the FCC, to be careful and cautious?

Mr. EISENACH. Mr. Rockefeller, could I respond to your point, and respond to it in the following way? In my written testimony, I suggest that looking at Universal Service is indeed important—and to read specifically what I said—looking especially at our policies regarding Universal Service and seeking new approaches that do not have the market-distorting effects of the current regime.

And what I would ask you to consider in this committee, and the FCC, on a going-forward basis, to consider is to separate, as you think about these issues, the end goal and objective from the current regime. The current regime is one which is internally funded through a series of very elaborate subsidies. Some of those subsidies have effects that may cut both ways. The mechanism, for example, for funding the schools and libraries provision is one which disproportionately raises the price of second telephone lines in the home or for small businesses. Those second telephone lines are precisely the means that many people in rural areas, as well as in urban areas, access the Internet.

So the net effect of all of that on the growth of electronic commerce and people's access to the Internet in all areas is a little difficult to discern. The law of unintended effects tends to govern when we get such convoluted mechanisms for achieving public policy and legitimate political aims.

And so what I would suggest to everyone involved in looking at this set of issues is that our aim should be to move toward a regime which meets the legitimate public policy aims of insuring that all Americans have equal access to the Internet and to all of its opportunities and to electronic commerce, broadly defined, but to do so in a way which relies on funding mechanisms and subsidy protocols which are not quite as distortionary and inflexible. And that is one thing, I think, to very much keep in mind.

If Mr. Daggatt were to leave this hearing having to plug into his business model a probability that at some point 3 to 5 years or a year down the road, his company may be subjected to an unknowable tax, to be determined by the FCC on the basis of some regressions that would be run by some FCC economists and an awful lot of legal bills in the process. That would deter and distract Mr. Daggatt from deploying a technology which really will be good for

all Americans in terms of getting access. We want to do as little as possible, I think, of that.

Senator BURNS. Can I break in here just for a second, because I have got a very important meeting at 12 noon?

I want to have Mr. Regan sort of respond to what Mr. Daggatt said a while ago, because I noticed your interest. You have been in the back of that chair all day and all at once you come off of the back of it, and that indicates to me that you might have something to offer this conversation.

Mr. REGAN. I would just as soon let someone else take the heat, you know. [Laughter.]

I think the point I would like to make about the discussion today—and I notice that there are two satellite companies here—and I do not want you to walk away with the impression that somehow one technology is better than another. I mean there are a lot of things that have to happen for any of this to be delivered to rural consumers at a cost which is going to beat the cost that they pay today. And that is really what we are talking about in the end.

It is not just a matter of the differential between the cost in a rural and the cost in an urban area. It is a matter of the level, as well.

And I am not smart enough to tell you which technology is going to win. But I am smart enough to tell you that we need to create an environment in which they are all going to compete against one another and we are going to get the lowest-cost solution. And I can tell you today, for example, fiber optics proves out as a very, very cost-effective solution for the delivery of virtually unlimited capacity in both directions for rural consumers today, because it beats the cost of copper.

So I guess what I would want you to walk away with is this notion that Universal Service is really, really important. But what we want to do as we move toward getting it is to make sure that we can get the ultimate level of competition between technology and between providers so we can bring the cost down for everybody.

Senator ROCKEFELLER. And I would agree with that, Mr. Regan, except that I never would put the word "but" after Universal Service. I would have a moment of sort of sacred silence.

Mr. REGAN. I respect it as well. Remember, Senator, Corning is in a very rural area. There are more cows than there are people in Corning.

Senator BURNS. Good choice. [Laughter.]

Senator ROCKEFELLER. Mr. Chairman, I also have to leave, but I do want to say that a lot of this is prospective. I mean the FDA—and a lot of people do not like the FDA, but then a lot of people are alive because of the FDA, because of something which they approved 4 years before, 4 years later they discovered that it had unintended consequences, et cetera, and they have to withdraw that from the market or issue a partial warning or whatever it is. So that everything that we do here affects people in such fundamental ways, and in fact even more so than the FDA, what the FCC is doing.

Because you, basically, will be determining whether Americans, on an equal basis, have the right to succeed—whether to 45 percent

or not, we will see—but whether they have the right to succeed in the most important single thing facing this country. And that is the ability to use knowledge and communicate knowledge efficiently and effectively. And that has to be, as this says, in many different forms, this little book here, in the public interest.

Senator BURNS. Senator, I would put a footnote on that, that just as important is the freedom to fail. And that is probably the most important part of our system here in this country is the freedom to fail, too. It is also a great motivator.

And with that, we should have some other questions for you. Your written statements will be made part of the record. You can respond both to the committee and to the Senators should that happen.

And I thank you for coming today. And these hearings are closed.

[Whereupon, at 11:50 a.m., the hearing was adjourned.]

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